Gas Journal

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Editorial Notes

Holding Companies

THE day of the small, isolated, if content, unit in the Gas Industry is over. This is not so much a matter of efficiency of gas production, though obviously this does enter largely into the question of giving a modern heat service to a public led to expect, and which now takes for granted, a wide and remarkable range of facilities. Thanks to the manufacturers of plant, who have had to cope with retail as well as wholesale demand, a small works has—and not through its own efforts—been assured of practically trouble-free gas-making plant. Such plant has needed a certain amount of attention, but little skilled attention. We believe that the prosperity of the Gas Industry is due in no small measure to the fact that the makers of gas-producing plant and gas consuming appliances are, for their custom, in competition.

Till recently, gas undertakings have enjoyed a virtual monopoly and have progressed—we speak now not only of municipally owned, but also of company owned, concerns—in spite of the handicap of a parochial outlook. The wide variance of policy between one undertaking and its immediate neighbour is to-day inexcusable.

We like, and always shall like, the absorption by a large gas undertaking of its adjacent smaller entities. That constitutes no argument against the holding company movement, which has been familiar in this country for years in connection with competing interests. The holding company movement has been subject to a good deal of criticism. Fear has been expressed that it would lead to loss of local interest and pride in undertakings taken over. We have heard quite a lot about inflation of capital—that the movement would inevitably lead to a bureaucratic system of a purely financial and disturbingly impersonal character. This criticism, and this must be noted, has not in the very least stemmed the tide of progress of holding companies in the Gas Industry. The ultimate success of the movement, of course, remains to be proved. But, surveying the situation dispassionately as it stands at the present time, we consider that the Industry is decidedly moderating its views, and that it is seeing fewer grounds for its original fears, at all events as regards the leading companies whose hands are becoming more fully exposed.

From the start we have adopted an impartial attitude in facing up to the possibilities, disastrous or advantageous, of the holding company movement. For long we have insisted that unless the smaller undertakings can be placed in a position to afford services comparable with those of their larger and more fortunately placed neighbours they will, apart from bringing discredit on the Industry as a whole, in time be forced out of business by the growing intensity of competition from other heat services. To-day the public demands a uniform supply of trouble-free energy and expects that the suppliers of this energy will offer ready facilities for the acquirement of the equipment essential to its use. The smaller undertakings are not able to afford easily the needed facilities for the hire or hire-purchase of gas consuming appliances, nor can they afford the equally necessary provision of trained, specialist personnel required for the satisfactory sale of gas in both home and industry. Without such facilities and without such staff business is bound to be lost. Then there is a broader aspect. The parochial outlook can no longer be endured if the Gas Industry is to effect that progress which lies at its threshold. If, then, the parochial outlook can be transformed—by whatever means adopted—into a nation-wide view, it is all to the good. Looked at dispassionately, the holding company movement has already accomplished much towards this most desirable end, without, we suggest, impairing local enthusiasm and local enterprise. After all, like all co-operative schemes, the success of the whole depends upon the success of the individual entities, and those in control of the responsible body would not in their interest do other than seek to foster the business-earning capacity of the individual units comprising the group.

We know that exceptional interest was taken in our recent account of the aims, aspirations, and working policy of the United Kingdom Gas Corporation, and the Industry has also had the opportunity of studying the Paper which Mr. G. M. Gill presented at the Annual Meeting of the Institution dealing with the progress to date of the Severn Valley Gas Corporation and Gas Consolidation. The discussion on this Paper did not direct any uncomfortable limelight on the activities of holding companies as the Gas Industry knows them. It afforded an opportunity for the critics, but surprisingly little criticism was forthcoming. On the other hand, the benefits of the movement to the individual undertaking were clearly brought out.

It will be remembered that, when the first storm of pro-

test against the system was raised a few years back, those who were mainly interested in the formation of the new grouping companies deigned to say very little in their own defence. While they went quietly ahead with the work of acquisition, backed by the irresistible force of the financial resources at their disposal, they merely replied, in effect, that they were not in the business purely for their health, and that they were gas-minded enough to realize that they could derive profit from their investments only by improving the working of their subsidiaries. Since those early days the movement has attracted to itself other eminent members of the Industry whose gas-mindedness, equally, could never be in question, and some of whom were formerly ardent critics.

It can be assumed that they are held to be on the way to discharging their obligations because, in spite of such sustained criticism as was voiced at the Institution Meeting by Mr. H. C. Smith and Mr. Fras. C. Briggs, the Industry, as we have said, is moderating its earlier violent opposition to the movement. This fact must not, however, be taken in too wide a sense, and does not, for example, imply a general licence to all and sundry who can raise a few thousand pounds to plunge into the business of the more or less indiscriminate purchase of gas undertakings at dubious prices with motives not very clear to anybody. In fact, in its own mind the Industry has probably adopted a generally accepted grading of the existing holding companies—even the best of them—based upon various factors in their make-up and their methods.

The A.P.L.E. Conference

EARLY as it may seem to refer at this juncture to an event still six weeks distant, we feel, nevertheless, that the moment is opportune to direct preliminary attention to the forthcoming Annual Conference of the Association of Public Lighting Engineers to be held at Folkestone from Sept. 6 to 9. We learn from Mr. H. O. Davies, the Hon. Secretary of the Association, that the 1937 Conference already promises to be an outstanding success; over 400 Local Authorities have so far indicated their intention to be represented, while the provisional programme which will be found on other pages of this week's "JOURNAL" gives every anticipation of an enjoyable and instructive gathering. Folkestone itself is a popular venue, and every effort is being made by the Corporation and by others who will entertain the delegates to make the occasion a memorable one.

Of particular interest to our own Industry, however, is the fact that this year is the Association's turn for a "gas" President, and no more suitable representative of the public lighting interests of the Gas Industry could have been found than Mr. C. I. Winstone, Public Lighting Superintendent of the Gas Light and Coke Company, who is well-known for his work for many years past in the street lighting field. Mr. Winstone, indeed, is responsible for the illumination of some of the most famous thoroughfares in the Metropolis, and he has been intimately connected with the increase during the past year in the number of public lamps in Westminster and district by over one thousand and the annual consumption by more than 20 million cu.ft. As a matter of fact, the hourly consumption of the gas lamps in this area now exceeds 300,000 cu.ft., giving a light output of approximately 60 million lumens. There is no doubt he will make a President of whom the Gas Industry can be proud.

We feel sure that it will be the wish of the Industry to do all in their power to support Mr. Winstone's Presidency of this important body, which is doing so much to render the roads of this country safer after nightfall and to assist in reducing the terrible toll of life and limb which is so disgraceful a reflection upon a civilized community. But even these sentiments, personal and humanitarian respectively, must not obscure the vital necessity for our Industry, by as strong a representation as possible, to uphold its claim that it can serve the public in this important respect with no fear of the best of other modern systems.

Folkestone next September will stage one of the finest practical exhibitions of street lighting that has ever been seen in this or any other country. The demonstrations are wisely to be confined to about one square mile in area, in which some 300 special lighting standards are to be erected with a view to showing the very latest and best in modern practice. Many of the main thoroughfares are to be entirely re-lighted for the occasion—and gas will play its full part in this. Public gratitude is due in this connection to Mr. G. le B. Diamond (Engineer and General Manager of the Folkestone Gas and Coke Company) and to Mr. P. G. Hobbs (Electrical Engineer), who in so good a cause have set their personal interests aside in co-operating with the local Borough Surveyor in arranging a fine series of demonstrations in various streets.

A Co-operative Effort

CO-OPERATIVE effort, however, has not been confined to the officials concerned with the organization of the A.P.L.E. Conference; particular reference must be made to the notable part which is being played in this connection by the manufacturers of gas lighting units and ancillary equipment. Leading members of the Lighting Section of the Society of British Gas Industries are associating themselves in the series of joint lighting demonstrations on a scale that has never before been attempted, and great credit is due to them for all they are doing to advance the cause of gas for street lighting in the interests of the Industry as a whole.

Public lighting accounts for about 5% of the Industry's total output, and it is, moreover, a particularly useful load in that it is taken during what are generally regarded as off-peak hours. The loss of this consumption would give many undertakings' sales curves a nasty jolt, which would take a lot of making up in other directions. We would therefore reiterate the importance—many times emphasized in these columns—of undertakings doing all in their power to maintain and increase their public lighting load from both revenue and propaganda viewpoints. And support of such conferences as these is a means towards that end, by providing the opportunity of learning at first-hand the latest developments in lighting technique and of inspecting the most modern equipment which the makers have to offer.

Several firms of manufacturers of gas lighting equipment depend for their very existence upon the Industry's efforts in promoting the street lighting load, and they are ready and willing at all times to do all they can by placing their expert technical services at the disposal of the Industry. And, indeed, they have effected wonderful improvements in their products in recent times. It is not too much to say that a great deal of the technical advance which is constantly being registered is due to the healthy rivalry with which these firms normally compete for the Industry's business. But, as with other sections of the manufacturers, when the call comes for a co-operative

effort there is usually a ready response. Unfortunately, there is noticeable at times a tendency on the part of the other side of the Industry to take such efforts rather for granted, and by merely half-hearted support to detract from the fullest effect obtainable from the expenditure of much time, trouble—and money. We have, therefore, this splendid co-operation of the manufacturers with one another, and with the Folkestone Gas Company; we have a gas President to support; we have before us a period during which more attention than ever is likely to be focussed upon improved highway lighting; and we have the goal before us of ensuring that the Gas Industry retains its rightful place in the performance of this leading national service. These are some of our reasons for urging a very particular effort on the part of gas undertakings to be represented at Folkestone on Sept. 6 to 9.

The Gas-Propelled Vehicle

THE Erren cycle for internal combustion engines forms the subject of an article in other pages of this issue. While it will be seen that the scheme envisaged in the Erren system is primarily concerned with hydrogen dependent on the electrolytic method of production, it merits the serious attention of the Gas Industry, for the Erren injection system enables coal gas to be used in the internal combustion engine with an actual gain in efficiency and power as compared with petrol.

It is claimed that the adoption of the Erren cycle effects a saving of 30% on the best figures that have yet been obtained in this country, enabling it to compete economically with all liquid fuel vehicles. We believe that at least one gas undertaking, which has for some time been closely identified with active measures relating to the gas-propelled vehicle and " bottled gas " services, is making serious enquiries into the possibilities of this invention to lend impetus to a growing " transport load."

If all that is claimed for the cycle can be substantiated —and from personal observation we have no reason at present to think otherwise—this invention puts an entirely new complexion on the case for the gas-propelled vehicle. At a time when, unfortunately, world unsettlement causes national self-sufficiency and defence to be an uppermost subject in everybody's mind, the implications are enormous of any system which promises relief from dependence upon important oil supplies. The claims of the Erren cycle will, therefore, undoubtedly be subjected to the closest scrutiny, and in so far as the Gas Industry is able to take a part in the investigation it will be ready to do so. In the meantime we commend to our readers a study of the technical details which we were able to cull from a recent highly interesting demonstration.

An Accession of Strength

IT is refreshing to find that even in these days great events are not always vulgarized with heavy headlines. The instance we have in mind occurs in the Press report of the July Meeting of the Central Executive Board of the National Gas Council. Reference to another page of this issue will reveal a quiet announcement that the Chairman reported with very great pleasure that membership of the Council had been strengthened by the addition of the South Metropolitan and other important London Gas Companies, and that Mr. E. V. Evans was most warmly welcomed as a member of the Central Executive Board.

This accession of strength to the common counsels of the Industry was, of course, foreshadowed at the Annual General Meeting of the Council in May, when Mr. Frank H. Jones took the opportunity of stating that he might shortly be leading into the fold a bigger flock than ever before. We are particularly happy to recall that he made it clear on that occasion that the decision was in no way connected with the then newly issued Report of the Joint Parliamentary Committee; that, in fact, Sir David Milne-Watson had known for some time that it had been made.

We have called the event a great one for our Industry; we have hailed it as an accession of strength. Further comment is entirely superfluous, but we would not wish to miss this opportunity of joining in the general welcome, " into the fold " if you will, of a group of Gas Companies of such vast technical and commercial experience, and so steeped in the tradition of the greatness of gas as a public utility.

The Kirkcaldy Holder

WE suppose that the Gas Engineer who got away with a new holder without a word of criticism or objection would probably pinch himself to ensure that he was fully awake; but we feel tempted to reiterate Macduff's famous question—" Stands Scotland where it did ?"—at this stage in the extraordinary developments (or lack of developments) which have followed the perfectly normal request on the part of the Gas Engineer at Kirkcaldy for increased storage capacity. Indeed, we feel sure that the sympathy of the whole Industry will be extended to those responsible for the technical supervision of this unfortunate concern, who must by this time be living rather in hope than expectation as regards the eventual erection of their little holder.

What local newspaper men have been pleased to descripe as the " gasometer controversy " has now been raging—obscured from time to time in a haze of acrimony —since the end of last year, with few signs as yet of a successful conclusion. Whenever a suggestion in regard to a suitable site is made it is invariably met with a " storm of protest;" whenever anyone submits a more or less intelligent report on the matter it is " referred back " with monotonous regularity. Requisitions, objections, protests, standing orders, suspension of standing orders have all so successfully contributed towards clouding the issue and protracting the proceedings that, frankly, one is almost inclined to think that the good people of Kirkcaldy have lost that capacity for clear thinking which is so well-known a quality of our compatriots North of the Border.

Glancing through the considerable number of references to the matter which have appeared from time to time in the " JOURNAL "—and a far greater number which have not—it is borne home upon us how very far from the truth was our original paragraph, published in all innocence, to the effect that " a 600,000 cu.ft. gasholder is to be erected at Pathhead." Probably never before have we been so wholly inaccurate over a simple statement. It almost passes comprehension how a straightforward decision on the part of a well-meaning Gas Undertaking to improve the service to its consumers by providing increased storage capacity could have raised such ill-considered outbursts from people who are probably the first to criticize the Undertaking if their own gas supply is not all that it might be—people who never gave two thoughts to gasholders at all until they foresaw the possibility of being able to see one by craning their necks from their bathroom windows.

If all this hullabaloo were capable of being translated

into terms of £ s. d. in time, effort, material, and temper expended we are ready to believe that it would have been cheaper for all concerned if the complete anomaly had been perpetrated of erecting a waterless holder on a floating dock on the waters of Loch Leven, ten miles away. And then, we suppose, the Society for the Preservation of Rural Amenities or the Board of Fisheries would have objected. We have never maintained that a gasholder is "a thing of beauty and a joy for ever," but surely it is putting a heavy responsibility upon a long-suffering Gas Committee to ask them—in the terms of the latest Council resolution on the matter—"to consider if, while utilizing the present site, it is economically possible to have a less objectionable method for providing the requirements." What does the Council want? A few hundred test holders surmounted by a roof garden? Or perhaps they would like a gasholder skilfully disguised as an electricity pylon.

In This Week's "JOURNAL"

Erren Cycle and Gas Propulsion.

For the Erren cycle for internal combustion vehicles, it is claimed when operating with town gas fuel there is a saving of 30% compared with the best figures yet obtained in this country. This claim, of course, has a very important bearing on the question of gas propulsion in this country. A description is published of our visit to the works of the Erren Engineering Co., Ltd.

See p. 173.

Mains and Services.

In a Paper to the Wales and Monmouthshire Junior Gas Association, Mr. H. V. Williams deals with the work connected with the Mains and Services Department of the Cardiff Gas Light and Coke Company which, since 1921, has installed services on housing estates at an average annual rate of 1,500.

See p. 174.

Institution Examination Results.

In their Report on the 1937 Examinations of The Institution of Gas Engineers—the list of successful candidates in which is published to-day—the Board of Examiners comment on the marked improvement in the conciseness of the answers in the Diploma Grade in Gas Engineering (Manufacture). In regard to the Higher Grade in Gas Engineering, however, many candidates showed a lack of knowledge of first principles, which indicated that a satisfactory knowledge of ancillary subjects had not been acquired. Candidates generally were not familiar with the subjects of gasholder construction and the performance of gas engines. It is significant that only a few candidates for the Higher Grade Certificate in Gas Supply attempted the question on lighting. In Gas Supply, Ordinary Grade, the knowledge shown by external candidates was of a high standard, and indicated that the Syllabus had been covered and that the subjects were well understood. There were three candidates, all of whom were successful, for the Diploma Examination in Gas Engineering (Supply).

See p. 179.

Personal

On behalf of the officials, staff, and employees of the Distribution Department of the Elland-cum-Greetland Gas Company, Mr. J. Bridge, Engineer and General Manager, recently presented Mr. JOHN DENHAM with a solid leather suit case.

Mr. Denham, who was Assistant Distribution Superintendent to the Company, is now taking up an appointment as Technical Assistant in the Industrial Gas Sales Department of the Preston Gas Company.

* * *

Miss LILY G. ASHWORTH, eldest daughter of Mr. J. B. Ashworth, Engineer and Manager of the Blackburn Gas Department, was married on July 16 to Mr. Robert Standing.

* * *

Mr. ROBERT POOLE has been elected a Director of Richmonds Gas Stove Company, Ltd. Mr. Poole is General Manager at the Warrington Works and Secretary to the Company.

* * *

Mr. R. L. GREAVES, Assistant Engineer and Manager to the Stockport Gas Department, has been appointed Engineer and Manager to the St. Helens Gas Department in succession to Mr. F. E. Ward, who intends to retire on Sept. 30, as recently announced in these columns.

Receiving his early training at Shrewsbury under Mr. C. M. D. Belton, F.C.I.S., Mr. Greaves was appointed Chief Chemist and later Technical Assistant to the Company. In 1929 he was appointed Assistant Works Superintendent to the Wolverhampton Gas Company. Mr. Greaves received his early education at Shrewsbury Secondary School and Shrewsbury Technical School. He was a part-time technical college teacher at Shrewsbury, and later at Wolverhampton.

Obituary

We regret to announce the death on July 18 of Mr. HAROLD DAVIS, at Bamville Wood, Harpenden Common, Hertfordshire. Mr. Davis was a Director of the Davis Gas Stove Company, Ltd.

* * *

The Gas Industry will extend its sympathy to Mrs. CLOUDESLEY BRERETON on the sudden death of Dr. Cloudesley Brereton. Dr. Brereton was a distinguished scholar and educationist, as well known in France as in this country. Of late years he farmed the family estate in Norfolk, and took a leading part in the activities of the Farmers' Union.

Forthcoming Engagements

July.

23.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
28.—I.G.E.—Pipes Committee, 2.30 p.m.

Aug.

10.—IRISH ASSOCIATION.—Annual Meeting at Belfast.

Sept.

6-9.—A.P.L.E.—14th Annual Meeting and Conference at Folkestone.
9-10.—NORTH BRITISH ASSOCIATION.—Annual Meeting at Edinburgh.
14.—N.G.C.—Central Executive Board Meeting, 2.30 p.m.
15.—I.G.E.—Finance Committee, 10 a.m.; Membership Committee, 11 a.m.; Research Executive Committee, 2.30 p.m.
16.—WALES AND MONMOUTHSHIRE ASSOCIATION.—General Meeting at Porthcawl.
16.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Refractory Materials Joint Committee, 2.30 p.m.
17.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
23.—S.B.G.I.—Council Meeting, 11 a.m.

Oct.

1.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
5.—I.G.E.—Research Executive Committee, 2.30 p.m.
12.—I.G.E.—Board of Examiners, 10.30 p.m.
13.—I.G.E.—Finance Committee, 9.30 a.m.; Membership Committee, 10 a.m.; General Purposes Committee, 11 a.m.; Benevolent Fund Committee of Management, 12.30 p.m.; Council, 2.30 p.m.
19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

Nov.

2.—I.G.E.—Council, 9.30 a.m.; Council (*continued*), 4.30 p.m.
2 and 3.—I.G.E.—Autumn Research Meeting.
3.—BRITISH GAS FEDERATION.—Annual General Meeting and Dinner, Grosvenor House, Park Lane, W. 1.

News in Brief

Gas is to Continue to Light Campbeltown's historic town hall despite a proposition to install electricity.

Gas Was Adopted for street lighting in Portknockie by the Town Council on July 13. The Cullen Gaslight Company are to carry out the scheme.

The Price of Gas at Burntisland has been reduced by 5d., making the price 2s. 11d. per 1,000 cu.ft., the new rate coming into force as from Aug. 1.

For Next Year's British Industries Fair in Birmingham we understand that nearly 90% of the available exhibiting space has already been applied for.

The Church Council Lighting Committee, who have considered the rival merits of electricity and gas for street illumination, have recommended a maintenance of street gas lighting.

An Increase of 5·84% in the amount of gas sold by the Sittingbourne and Milton Gas Department during the year ended March 31, 1937, is reported by the Engineer and Manager, Mr. G. V. Heeley. This increase is on gas sold for domestic and not industrial purposes.

Copies of the Following British Standard Specification may be obtained, price 2s. each, from the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1: 740-1937. Portable Chemical Fire Extinguishers, Foam and Carbon Tetrachloride, Type.

The Tender of Messrs. Drakes, Ltd., of Halifax, is recommended by the Keighley Gas Committee for acceptance by the Town Council for the installation of a new vertical retort plant, 1,500,000 cu.ft. per day capacity. The existing horizontal plant has been in operation since 1915.

A Bulk Supply of gas is likely to be taken by Lennoxtown from Kirkintilloch in the near future, the Kirkintilloch Town Council having given notice of their intention to apply to the Board of Trade for a Special Order enabling them to purchase the Lennoxtown Gas Light Company.

The Building Centre during the year ended May 31, 1937, had a total number of visitors of 68,776. Over 97,000 technical enquiries were dealt with and 84,807 Information Sheets were issued to applicants on behalf of manufacturers. Progress is being made with the organizing of the new Hospital Section which is to be located in the two upper floors of the Bond Street building.

Tar is the Best Rust Preventative for bolts and nuts. This was shown by experiments on agricultural implements recently carried out in Germany. Where bolt threads had been treated with such tar before use, the nuts could be loosened with ease even after ten years, and even under the severest conditions of moisture and chemical action tar provided protection for from three to six years.

First Prize was secured by the Calverley and Horsforth Gas Company, and the Yeadon and Guiseley Gas Company shared with a perfumery firm the third prize, in the trade exhibit class at the Rawdon annual charity carnival on July 10. Rawdon is the administrative centre of the new combined Urban District of Aireborough, in which both undertakings have a substantial part of their supply areas.

Heating a Sea Water Swimming Pool

Successful Experiments at Morecambe

Reference was made in the "JOURNAL" last March to proposals for heating Morecambe's swimming pool by gas. The pool contains 1,250,000 gallons of sea water in the open air, and it is believed to be the largest in the country to be heated by gas.

Recent experiments have shown that the adoption of gas for this purpose was fully justified, for, despite a falling air temperature, it was found that the water could be raised from 60° to 72° F. in 52 hours—so that comfortable bathing conditions in any weather is now guaranteed.

The gas plant at the Morecambe Swimming Stadium consists of a Cochran-Kirke boiler for the laundry and two low-pressure boilers for central heating, while a large unit of the same type is used for heating the water in the pool. The consumption of gas is expected to be from five to ten million cu.ft. per annum, according to the weather conditions.

CURRENT EVENTS IN THE GAS INDUSTRY

British Commercial Gas Association

Forthcoming Annual Conference

By invitation of the Lord Mayor and Chairman and members of the Manchester Gas Committee, the Twenty-Sixth Annual General Meeting and Conference of the British Commercial Gas Association will be held in Manchester from the evening of Sept. 26 to Sept. 29 inclusive.

The Conference is to be held under the Presidency of Councillor W. P. Jackson, J.P. (Chairman of the Manchester Corporation Gas Committee), and the following provisional programme has been arranged:

Sunday, Sept. 26.

Evening: Programme of Gas Propaganda films (ladies invited).

Monday, Sept. 27.

Morning: } Blackpool Tour or Tour of Lake District (ladies invited).
Afternoon: }
Evening: Reception (ladies invited).

Tuesday, Sept. 28.

Morning: First Session—Town Hall.
Luncheon.
Afternoon: Second Session—Visit to Satellite Town of Wythenshawe (ladies invited).
Evening: Dinner.

Wednesday, Sept. 29.

Morning: Third Session—Town Hall.
Luncheon.
Afternoon: Ship Canal Tour or Visit to Trafford Park (ladies invited).

Those intending to be present at the Conference are advised to make early hotel reservations.

Refrigerators at a Shilling a Week

L.C.C. Endorses New G.L.C. "All-in" Plan

The London County Council in conjunction with the Gas Light and Coke Company is to give its working-class tenants on the Roehampton Estate the opportunity of having "Electrolux" refrigerators which they can hire at the all-in charge of 1s. per week. This includes the cost of the gas consumption, as well as installation and maintenance.

In announcing this new departure, Sir David Milne-Watson, Governor of the Gas Light and Coke Company, said that working-class tenants would benefit probably more than anyone else by cheap refrigeration. They had usually little larder room, space was limited and the adequate ventilation of kitchen and living room was a matter of some difficulty. A year or two ago refrigerators were considered a luxury even by people of some financial standing. To-day the working-class tenant in addition to being able to get modern labour-saving appliances for cooking, heating, and water heating, would be able to get first-class refrigeration at less than 2d. a day, and in budgeting would know exactly how much that service would cost.

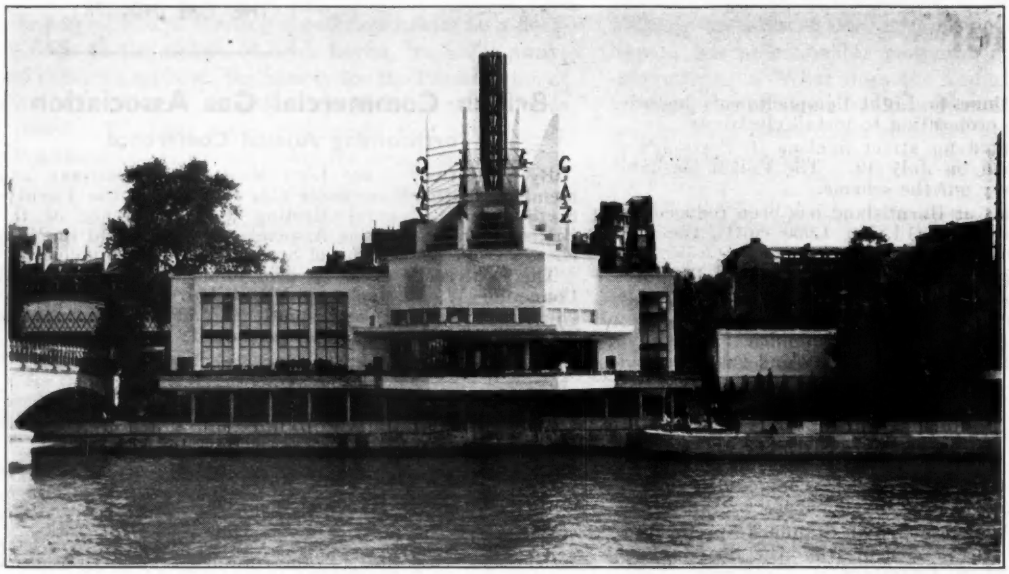
The co-operation of the L.C.C. was, he was sure, a sign that similar facilities would soon be available on other housing estates throughout the country.

Sir David pointed out that it was a coincidence that while details of the scheme were being completed a fortnight or so ago Mr. T. Johnston, M.P. for Stirling and Clackmannan (Western), advocated in the House of Commons the need for making cheaper refrigerators available for the working-classes, referring to modern refrigeration as one of the greatest of recent technical advances in civilization. "Everybody," he said, "who has followed the latest discussions on nutrition knows that there is a consensus of opinion that unless refrigeration is made possible in the homes of the people, satisfactory diets are impossible."

The new refrigerator designed for the Roehampton Estate is suitable for the average family of four. It is of sufficient size to hold milk, butter, and other perishable foods. Tenants are to be interviewed by the Company's salesmen, and all orders will be endorsed by the Council before being carried out.

Preliminary calls on the estate indicate that there is a very much greater desire, even than was anticipated, for this new service.

How the Gas Industry was Represented



A GENERAL VIEW OF THE GAS PAVILION.

at the Paris International Exhibition

The central portion is illuminated to symbolize the flame of a gas jet. Inside the pavilion all lighting apparatus is arranged on the ground floor, cooking appliances on the first floor, and industrial equipment on the top floor. The premises include a lecture hall and some fine dioramas.

Association of Public Lighting Engineers

Preliminary Programme of Annual Conference at Folkestone

The following is the preliminary programme which has been arranged for the 14th Annual Meeting and Conference of the Association of Public Lighting Engineers to be held at Folkestone from Sept. 6 to 9 under the Presidency of Mr. C. I. Winstone, Public Lighting Superintendent of the Gas Light and Company, Ltd.

Monday, Sept. 6.

2.30 p.m. Council Meeting. Pavilion Hotel.
4. 0 p.m. Annual General Meeting. Conference Hall.
8. 0 p.m. Reception and Dance by invitation of His Worship the Mayor of Folkestone. Leas Cliff Hall.

Tuesday, Sept. 7.

10. 0 a.m. Civic Welcome by His Worship the Mayor of Folkestone. Conference Hall.
Presentation of Badge to retiring President.
1. Presidential Address by Mr. C. I. Winstone.
11. 0 a.m. Conference Session. Conference Hall.
2. Paper—"The Application of Modern Electric Lamps to Street Lighting," by Mr. G. H. Wilson.
12 30 p.m. Conference Photograph. Members and Delegates are invited to be included in this group. Outside Hotel.
1. 0 p.m. Luncheon at the invitation of the Governor and Directors of the Gas Light and Coke Company, Ltd. Ladies invited. Pavilion Hotel.
3 15 p.m. Conference Session. Conference Hall.
3. Paper—"Some Further Experiments in Street Lighting," by Dr. S. English and Mr. E. Stroud.
7.30 p.m. Conversazione. Light refreshments. Music. Pavilion Hotel.
N.B.—This function is intended to provide an opportunity for informal talks and discussions by small groups of Delegates on matters of technical interest, and an opportunity should be taken of inspecting the street lighting and floodlighting exhibits in the town. Motor Coaches will make circular tours at a moderate charge.

Wednesday, Sept. 8.

10. 0 a.m. Conference Session. Conference Hall.
4. Paper—"High Intensity Gas Lamps," by Mr. G. Keith.
5. Paper—"Street Lighting by Gas, with Special Reference to the High-Pressure System," by Mr. Dean Chandler.
2. 0 p.m. (sharp). Choice of three Excursions—
(*a*) Canterbury.
(*b*) Dover and Walmer.
(*c*) Lympne Aerodrome.
(Return by 5.30 p.m.)
7. 0 p.m. for 7.30 p.m. to 1 a.m. Annual Banquet and Dance. Pavilion Hotel.

Thursday, Sept. 9.

10. 0 a.m. Conference Session. Conference Hall.
6. Paper—"Recent Developments in Low-Pressure Gas Street Lighting," by Mr. F. C. Smith and Mr. K. F. Sawyer.
2.30 p.m. Conference Session. Conference Hall.
7. Paper—"Planned Street Lighting," with Film Demonstrations, by Mr. T. Catten and Mr. G. S. C. Lucas.
4.30 p.m. Council Meeting—Votes of Thanks, &c. Pavilion Hotel.

The Conference Enquiry Bureau will be at the Pavilion Hotel.

New Showrooms at Littlehampton

Advisory Home Service Section

For months past in Beach Road, Littlehampton, amid a forest of scaffolding within which an army of workmen has been engaged, a new showroom of the Brighton, Hove, and Worthing Gas Company has been gradually taking shape. The showroom is now at the service of the Company's consumers in the Littlehampton area. Situated in the heart of the town, the new premises are more convenient than the old showrooms in Terminus Road.

The spacious modern colourful interior of the new showrooms is a fit setting for the many beautiful appliances the Company has to offer to their consumers.

Although the premises will be open on Monday for demonstrations by the Home Service Section, which is an important feature of these new showrooms, the official opening is to take place later in the year.

Gas Charges at Dunfermline

Revised Scale to be Introduced

A revised scale of charges is to be introduced by the Dunfermline Gas Department on Aug. 15 next whereby the additional 5d. per 1,000 cu.ft., hitherto charged to prepayment consumers on their whole consumption, will only be levied on the first block in the scale—*i.e.*, on 6,000 cu.ft. per quarter—the remaining consumption being charged at the same rate as ordinary consumers. This concession will also apply to districts outside the city.

The new scale is as follows:

—	Ordinary.	Prepayment.
	s. d.	s. d.
Not exceeding 6,000 cu.ft. per quarter . .	3 1	3 6
6,000 to 500,000 ,, ,, . .	2 1	2 1
500,000 ,, 1,000,000 ,, ,, . .	1 9	..
Over 1,000,000 ,, ,, . .	1 6	..

In the Kincardine district, where the Dunfermline Corporation took over the gas undertaking two years ago, a revised scale is to be brought into operation under which both classes of consumer will be charged 5s. per 1,000 cu.ft. on the first block of 6,000 cu.ft. per quarter and any consumption above that quantity at the second block rate applicable in all other country districts—namely, 2s. 7d. per 1,000 cu.ft.

When the Kincardine supply was taken over by Dunfermline the price of gas was 7s. 6d. per 1,000 cu.ft., and since the initial reduction to a 5s. flat rate the consumption has grown satisfactorily. This last concession should still further stimulate business.

Gas Hotplates for Electric Cookers

Judgment Against the Egham and Staines Electricity Company

On Monday Mr. Justice Farwell gave judgment against the Egham and Staines Electricity Company, Ltd., in an action in which they claimed an injunction to restrain the defendants, the Gas Light and Coke Company, from procuring or inciting any persons who had entered into agreements with the plaintiff Company for the hire of electric cookers to permit the affixing to those electric cookers of gas hotplates. An injunction was also asked to restrain the Gas Light and Coke Company from affixing gas hotplates or similar apparatus to any electric cooker hired by the plaintiffs to their consumers.

The defendant Company denied that they had committed any of the acts complained of.

Sir Walter Monckton, K.C., and Mr. Alfred Tylor appeared for the plaintiffs; Mr. A. T. Miller, K.C., and Mr. Hubert Hull for the defendants.

Mr. Justice Farwell, in giving judgment, said that there was undoubtedly keen rivalry between the plaintiff and defendant companies in the area affected. Many householders liked to have both gas and electric cooking apparatus in their homes. To meet the needs of those people the defendant Company had put on the market a hotplate to burn gas, the plate being of such dimensions that it fitted conveniently on the top of an electric cooker. Many consumers had those hotplates fitted.

The plaintiffs hired to consumers of electricity within their area electric cookers under agreements which provided that no alteration or addition should be made to the cooker without the previous written consent of the plaintiffs. In his (his Lordship's) judgment to suggest that the "Argyle" hotplate supplied by the defendants, which merely stood on the electric cooker, or, indeed, on anything else, was such an addition to or alteration of the apparatus of the plaintiff Company as was contemplated by the agreement between the plaintiff Company and its customers bordered on the ridiculous.

There was, therefore, no breach of contract by any customer of the plaintiff Company and no wrongful inducement of a breach of contract by the defendant Company. The action would be dismissed with costs.

National Gas Council

Meeting of the Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House on Tuesday, July 13, 1937, at 2.30 p.m.

Pending the election of Chairman, Councillor G. H. Kitson was voted to the Chair.

In moving that Sir David Milne-Watson be elected to the Chair, Councillor Kitson referred to the Baronetcy which had been conferred upon Sir David by His Majesty the King, and said he felt that this recognition was a compliment to the whole of the Gas Industry which Sir David had served so faithfully for so many years. Councillor Kitson said that the Board hoped that Sir David would live long to enjoy the honour which he had so richly deserved.

Sir David was thereupon unanimously re-elected Chairman of the Board for the ensuing year.

Mr. Wm. Phillips, of Luton, expressed the thanks of the Board for the arrangement made by the President and his Company in connection with the seats for the Coronation. Mr. A. L. Jennings, of Spenborough, also added his testimony to the excellent arrangements which had been made.

The following Vice-Chairmen were unanimously re-elected, viz.: Alderman J. H. Lloyd, M.A., J.P., Mr. Frank Jones, M.Inst.C.E., Mr. William Cash, F.C.A., J.P., and Councillor G. H. Kitson.

South Metropolitan and Allied Gas Companies.—The Chairman reported with very great pleasure that membership of the Council had been strengthened by the addition of the South Metropolitan and other important London Gas Companies. He moved that Mr. E. V. Evans be co-opted a member of the Central Executive Board, and the motion was seconded by Mr. A. W. Smith and unanimously approved.

On behalf of the Board the Chairman warmly welcomed Mr. Evans.

Election of Representatives of The Institution of Gas Engineers.—It was reported that the following representatives had been appointed to serve on the Board for the ensuing year in accordance with the Rules, viz.: Mr. Geo. Dixon, B.Eng., M.Inst.C.E., Mr. Stephen Lacey, B.Sc., M.Inst.C.E., Mr. R Robertson, and Mr. John Terrace, M.Inst.C.E.

Co-opted Member of the Board.—Col. W. M. Carr, O.B.E., T.D., was co-opted a member of the Central Executive Board.

Re-appointment of Committees of the Council for the Forthcoming Year.—The Board duly re-elected the members to serve on the following Committees for the ensuing year, viz.: Emergency Executive Committee, Finance Committee, Establishment Committee, Joint Standing Finance Committee, Committee on Rating and Valuation, Consultative Committee with Coke Oven Owners, Railway Station Lighting Committee, Air Raid Precautions Committee, Committee with regard to the Joint Parliamentary Committee on Gas Charges, Central Joint Consultative Coal Committee, Committee with regard to the supply of Gas to the War Department, and Committee on Mains and Cables in Highways; and the following Committee was discharged: Consultative Committee with Coalowners.

Coal.—The general position with regard to the coal industry and the working of the Joint Consultative Committees, and the further steps which should be taken to safeguard the interests of consumers, were considered.

Coke—Formation of Gas Coke Export Association.—A memorandum was submitted with regard to the formation of this Association, together with the names of the gas undertakings who were members of the body, and an explanatory statement of the objects and work of the Association.

The Board approved the aims and objects of the Association, and recommended all gas undertakings being exporters of coke to become members. It was decided that this resolution should be sent to the Secretaries of the District Executive Boards asking them to take an early opportunity of raising the matter at their meetings.

Parliamentary.—The following matters were considered:

(*a*) Finance Bill—
  (i.) National Defence Contribution.
  (ii.) Allowance in respect of buildings.
  (iii.) Reduction of duty on tower wagons.
(*b*) Public Health (Drainage of Trade Premises) Bill.
(*c*) Factories Bill.

Railway Rates—Review of Standard Charges.—The evidence which was given by Mr. S. S. Ogilvie, Joint Manager of the Council, before the Railway Rates Tribunal in opposition to the suggested increase in Railway Charges so far as coal, coke, and patent fuel were concerned, was unanimously approved. A resolution was passed recording the thanks of the Board to Mr. A. W. Smith for the assistance rendered to the Council in connection with this matter.

Conjoint Conference of Public Utility Associations.—A report of the meeting of the Council of the Conference held on July 8 was submitted on the following matters, viz.:

(*a*) Mains and Cables.
(*b*) Rating and Valuation.
(*c*) Staffordshire County Council Bill.

Metal Discs in Automatic Meters.—It was reported that it had been suggested that the Council should take up this question with the National Chambers of Trade, and it was decided that information should be obtained as to the extent of the trouble throughout the country.

British Industries Fair, Birmingham, 1938.—Mr. W. J. Sandeman and Mr. C. M. D. Belton were unanimously re-appointed to represent the Council on the Gas Industries Section Committee for 1938.

Central Gas Advisory Board.—The following representatives were unanimously re-elected to represent the National Gas Council on this Board, viz.: Mr. Stephen Lacey, B.Sc., M.Inst.C.E., Mr. J. W. McLusky, M.I.Mech.E., Mr. C. S. Shapley, M.I.Mech.E., and Mr. S. Tagg, M.Inst.C.E., J.P.

Date of Next Meeting.—It was decided that the next meeting of the Board should be held on Tuesday, Sept. 14, 1937, at 2.30 p.m.

Gas in Modern Flats

Large Sheffield Order

The builders of Regent Court, Hillsborough, a huge block of luxury flats in Bradfield Road, Sheffield, which are in course of construction, have placed an order with the Sheffield Gas Company for over 200 "Electrolux" refrigerators, and also 200 Parkinson "Renown" cookers. This order was secured in face of intense competition.

Tenants of Regent Court will enjoy the beauty, economy, and efficiency of ultra-modern gas equipment in their kitchen. This is proof in itself that "to modernize with gas" is no empty phrase.

North British Association of Gas Managers

Annual Meeting at Edinburgh

The annual general meeting of the North British Association of Gas Managers will be held in the Freemasons' Hall, George Street, Edinburgh, on Thursday and Friday, Sept. 9 and 10. There will be no excursion.

The Edinburgh Corporation will accord a civic reception to the members and their ladies in the Assembly Rooms, George Street, on the Thursday evening. The guests will be received by the Lord Provost, the Right Honourable Sir Louis S. Gumley. After the morning session on Thursday, members will be the guests of the Corporation at luncheon in the Assembly Rooms at 1 p.m.

The golf competition for the Association Challenge Bowl will take place on Wednesday, Sept. 8, over the Luffness Course, which is situated between Aberlady and Gullane. The bowling competition will take place on the same day as the golf competition on the Grange Bowling Green, Hope Terrace, Edinburgh, at 2 p.m. A golf competition for the ladies will also be held on Sept. 8.

International Gas Union

Paris Board Meeting

The Board of the International Gas Union, with M. A. Baril, President, in the Chair, met on Saturday, June 12, 1937, on the occasion of the Third International Congress of the Gas Industry in Paris.

In addition to M. Baril (France), the following delegates were present at the meeting: F. Escher, Honorary President (Switzerland); H. Müller, Vice-President, W. Hoffmann, and Zur Nedden (Germany); J. Dollinger (Austria); V. Timmermans (Belgium); Alexander Forward, representing Mr. Clifford E. Paige, Vice-President (United States); J. Thuillier (France); C. Valon Bennett, Vice-President, J. R. W. Alexander, and W. T. K. Braunholtz (Great Britain); G. A. Brender à Brandis, Vice-President (Holland); Madame J. Czaplicka (Poland); G. H. Hultman and E. A. Göth (Sweden); M. Thoma, W. Tobler, and H. Zollikofer (Switzerland); Th. Keclik (Czechoslovakia); and P. Mougin, General Secretary of the International Union.

The Board first ratified the decisions taken at the meeting held in The Hague on Feb. 20, 1937, and recorded the admission of the following new members of the Board: E. Mianowski and I. Wielezynski and Madame J. Czaplicka for Poland, and Dr. J. Dollinger for Austria.

M. A. Baril drew attention to the fact that his year of office terminated with the Third International Congress. He expressed the pleasure he had had in leading the destinies of the International Union, and the agreeable memory he would retain of his three years as President. Having once more thanked the members of the Board for the confidence they had shown in him, he asked them to make proposals for the election of the new President and Vice-Presidents.

Mr. C. Valon Bennett, after expressing his thanks to the first two Presidents of the International Union, Messrs. F. Escher and A. Baril, for their devotion and their activity, proposed to the Board the name of Dr. H. Müller as future President.

By unanimous accord Dr. H. Müller, Vice-President of the International Union, Honorary President of the Deutscher Verein von Gas- und Wasserfachmännern, Director of the Deutschen Continental Gas-Gesellschaft of Dessau, was elected, for three years, President. Expressing appreciation of the honour extended to him, Dr. Müller sincerely thanked the Board, and in particular M. Baril and Mr. Valon Bennett.

Taking into consideration the proposals put forward, the Board then proceeded with the election of the Vice-Presidents.

The Board finally examined the question of the Secretariat of the International Union. For reasons of material convenience, and upon the suggestion of M. Baril, it was decided to transfer the administrative offices of the International Union to *Zurich*, 18 *Dreikönigstrasse*. The Board furthermore appointed *Mr. Hermann Zollikofer as Secretary General of the International Union.*

At the opening meeting of the Third Congress (reported in the "JOURNAL" for June 23) it will be recalled M. Baril, retiring President, was unanimously elected Honorary President.

The officers for a new period of three years are as follows:

President.—H. Müller (Germany).

Honorary Presidents.—F. Escher (Switzerland) and A. Baril (France).

Vice-Presidents.—J. de Brouwer (Belgium), Clifford E. Paige (United States), C. Valon Bennett (Great Britain), M. Böhm (Italy), Brender à Brandis (Holland), G. H. Hultman (Sweden), and Th. Keclik (Czechoslovakia).

General Secretary.—H. Zollikofer (Switzerland).

In conformity with Article 4 of the Statutes, which provides that "the national organization to which the President belongs shall, in principle, undertake to organize the Congress," the Fourth International Congress of the Gas Industry will be held at Berlin in 1940.

In the Camberley Carnival

An attractive tableau entered in the Camberley Hospital Carnival by the Yorktown (Camberley) and District Gas and Electricity Company on July 14.

Birmingham Health Congress

Gas Industry Awarded Silver Medals

A great variety of interests were represented at the Health Congress arranged by the Royal Sanitary Institute which opened at Birmingham on July 12. The Gas Industry was well represented in an exhibition held at Bingley Hall and two silver medals were awarded for gas appliances. The Birmingham Gas Department secured one of the honours for a comprehensive display of cooking and heating appliances, while a new gas cooker to be put on the market by Messrs. Sidney Flavel & Co., Ltd., Leamington, also obtained a silver medal. Details of this cooker are to be announced later.

The Earl of Dudley is President of the Congress and the Lord Mayor of Birmingham (Ald. Harold Roberts) is President of the Local Authorities' Conference. Over 1,600 members attended the Congress which discussed a variety of health subjects.

The Birmingham Gas Department's exhibit emphasized the contribution made by modern gas appliances to the amenities of to-day.

The displays admirably portrayed the great part gas plays in the maintenance of health. The gas-operated refrigerator for the hygienic storage of perishable foodstuffs, the water heater providing an unfailing, prompt, and copious supply of really hot water, thus satisfying one of the greatest demands of hygiene, and the cooker for the correct preparation of food. The diversity of uses for gas in hospitals, institutions, and factories was typified by a wide selection of appliances.

On a stand dealing with smokeless fuel there was a working exhibit of the "Eagle" coke fire, ignited by means of a gas burner and using small household coke. There was shown for the first time an independent coke fire apparatus with a patent draw plate by means of which the coke fire can be easily ignited and regulated so that at any time it can be brought up to a state of incandescence. Another exhibit was a new type of "Eagle" basket coke fire for an open hearth. By means of a fixed ash pan with an air slide control of the rate of burning can be obtained. A "C.C." coke fire was shown in chromium complete with a gas fire in front. There was also a range of Brockhouse and "Emscote" grates.

Messrs. Sidney Flavel & Co., Ltd., had a wide range of gas appliances and gas radiators. These included radiant-panel gas heaters in standard, garage, built-in, and elevated forms in a number of sizes and attractive finishes. There was a series of "Elf" cookers, solid folding top cookers, and built-in wall fires.

The Erren Cycle

for Internal Combustion Engines

In perfecting the work of R. A. Erren and his German associates, the Erren Engineering Co., Ltd., claim the adoption of the cycle will effect a saving of 30% on present town gas-fired vehicles.

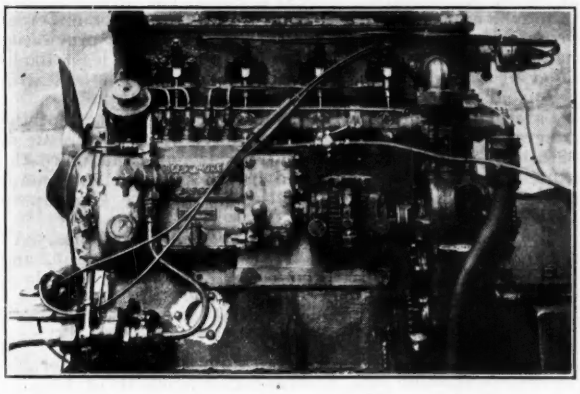
We were privileged recently to inspect various internal combustion engines running on the Erren cycle, for which, among many other advantages, it is claimed that its adoption effects a saving of 30% on the present gas-fuel motors.

For three years research by the Erren Engineering Company, Ltd., 99, King's Road, Chelsea, S.W., in conjunction with Messrs. William Beardmore & Co., Ltd., has been going on quietly to perfect the work of R. A. Erren and his associates in Germany. From work that had been inconclusive, definite results have now been obtained. The object of this research has been to produce an engine capable of running on home-produced fuel—namely, hydrogen (a natural product of water produced cheaply by the electrolytic method in high-pressure electrolyzers) or town gas. The use of these fuels would release oil and petrol for storage for use by the fighting services. It has been estimated that for every ton of imported petrol supplanted by the adoption of the Erren cycle six tons of coal would be used.

The Erren engine can utilize coal, water, or coke oven gas. When running on coal gas, it is claimed that instead of a loss of approximately 30% in efficiency as compared with petrol, an engine will show an actual increase of 4%.

The Cycle Explained.

The Erren cycle is an entirely new method of operating internal combustion engines on gas fuels, containing hydrogen as one of their constituents. The gas may be used alone or in conjunction with liquid fuels. The principle



An A.E.C. four-cylinder engine converted to the Erren system. The patent rotary valve can be seen running the length of the cylinder block just above the level of the fan shaft.

has been developed to overcome the disadvantages in the normal methods of using gas fuels and to add advantages of its own in regard to power output, efficiency, and flexibility of control.

Briefly, the cycle works on constant full air admission, thus giving optimum volumetric efficiency at all loads, with injection of the gaseous fuel under pressure during the compression stroke. The advantages of this system can best be illustrated by comparing the Erren cycle with the normal method of aspirating a carburetted mixture of gas and air. Here it may be pointed out that although the Erren engine was, in the first place, designed for running on hydrogen alone, either with air, or, for special purposes, with oxygen only, the same tests have now been carried out with similarly successful results with coal gas and water gas.

In the normal arrangement of engines running on gas fuel, which applies also to petrol engines, the gas or vapour is aspirated into the cylinder on the suction stroke at the same time as the air charge. It is inevitable, then, that in this system as the supply of gas fuel is increased, the volume, and, therefore, the weight of air drawn in will be proportionately decreased. The air supply, therefore, cannot be constant on the range of output. The Erren patent, as well as the Diesel liquid fuel engine, provides for an air charge whose quantity is unaffected by the fuel admission. Hence the air charge in a normal engine is always less than in the Erren engine, and the power output is directly proportional to the weight of air available for combustion. Proportionately more fuel can be burned in the Erren engine with a proportionate increase in output. This may be expressed quantitatively; the energy developed per pound of air by combustion with gas is a maximum in the case of hydrogen, when the volumes are in the proportion approximately of 100 volumes of air to 42 volumes of hydrogen. With the normal arrangement, since the cylinder volume is filled with air *plus* hydrogen, the volume of air present is $\frac{100}{100 + 42}$ or 70% of the total volume. Theoretically, therefore, the maximum possible output is only 70% of the power available from the Erren. This fact has been borne out by exhaustive tests.

"Pre-Supercharging."

The increased charge is, in effect, supercharging, since the total charge is augmented beyond what is possible by normal aspiration. It might be described as "pre-supercharging" in that pressure energy is applied, not to the whole air-fuel charge, but to the fuel in storing it under pressure in containers. As the Erren system envisages the application of high-pressure storage as it is already exploited in Germany by a network of pressure gas-filling stations, it is merely taking advantage of the kinetic energy in the compressed gas for auto-injection instead of relying on atmospheric pressure or mechanical pumps.

Here may be explained the reason for the placing of the fuel injection period in the Erren cycle. From the foregoing it is shown that the fuel injection must be *after* the air charge admission. This leaves a possible choice of any point in the cycle between the closing of the inlet valve and the initiation of combustion. It might appear at first sight the obvious method would be to inject at top dead centre according to the diesel cycle. This is impossible owing to the physical difference between liquids and gases. A diesel injector can only penetrate the high density air charge by virtue of the relatively higher density of the liquid spray. A very much higher injection pressure would be required for gas fuel, in addition to which owing to the high spontaneous ignition temperature, still higher pressure would be necessary for compression ignition. Hence the fuel in the Erren engine is fired by magneto or coil as in normal petrol engine practice.

After lengthy trials the best injection period was arrived at, and is fundamental to the Erren patent cycle.

Power Control.

The power output is entirely controlled by varying the admission of the fuel in a constant air charge. The gas injection is controlled by a special form of rotary valve, itself an Erren patent, which is situated on the side of the cylinder block and injects through a nozzle fitted through the water jacket into the wall of the cylinder. This fact enables any type of engine to be converted without any modification other than the piercing of the cylinders and the provision of a drive for the valve. Hence the functioning of the engine on its normal fuel is not interfered with, and the engine after conversion can run on alternative fuel systems or a combination of both.

Among the advantages claimed for the Erren engine are: A high brake thermal efficiency; low running costs; rapid acceleration; and a high starting torque.

Among the internal combustion engines we were able to inspect was a "National," with a 10 : 1 compression ratio,

and equipped to run as a diesel, as a gas engine on the Erren system, or on the ordinary carburation system; a "Morris," showing the simplicity of converting a petrol engine to the Erren system and the possibility of instantaneous change-over from petrol to gas operation and *vice versa;* and a "Krupp" two-stroke, showing the application of the Erren system to a heavy industrial, slow-speed, engine. A remarkable feature of the last example is that it is able to run at as low a speed as 35 r.p.m.

Of particular interest is the motor omnibus propelled by a four-cylinder four-stroke Beardmore diesel engine converted to an Erren engine and having a seating capacity of thirty-two. No alterations have been made to the normal design of the engine. The special injection apparatus has been inserted in the cylinder wall and sparking plugs fitted in the head. Points demonstrated in a trial run during our visit to the works were the ease of starting on gas fuel, acceleration speed, hill climbing, and changing over from hydrogen to coal gas while running.

The actual consumption figures for this 'bus are as follows: On one gallon of diesel oil a run of 11·6 miles was recorded. On town gas, 0·66 cub. metres were used per mile, which is approximately equal to 23·3 cu.ft. per mile. On coal gas 7·7 cub. metres (272 cu.ft.) is equal to one gallon of diesel oil. Also 5·9 cub. metres (208 cu.ft.) is the equivalent of one gallon of petrol when the 'bus is running on town gas.

The cost of coal gas compression in Germany to 200 atmospheres is 10 pfennigs (1·2d.) per cub. metre on a sale of 30,000 cub. metres per month. This is equivalent to 2s. 10d. per 1,000 cu.ft., 6·8d. per 200 cu.ft., which is roughly equal to one gallon of petrol. In Germany the use of gas as a fuel is increasing very rapidly, and the use of the Erren system ensures an economy of 20% over the best German figures for gas consumption. The number of filling stations in that country is also increasing very rapidly; fueling stations have been installed throughout the length of the Berlin-Hanover road. In Berlin itself one 'bus route covering 2,460 miles daily is entirely converted to gas propulsion.

Mains and Services

by

H. V. WILLIAMS

(of the Cardiff Gas Light and Coke Company)

From a Paper read before members of the Wales and Monmouthshire Junior Gas Association at a meeting held at Cardiff on March 20—Mr. J. H. CHAPMAN, of Swansea (the President), in the chair.

This is a time when the closest co-operation between each department of a Gas Undertaking, from the retort house to the consumer, is essential for its well-being, not the least important factor being that of responsibility for the delivery of gas to the consumers' premises.

The work connected with the Mains and Services Department in Cardiff is carried out by a mains gang, consisting of a foreman, two jointmakers, a pipelayer, and about a dozen labourers, the latter varying as circumstances demand, and a number of service-laying gangs each consisting of a service layer and from four to six labourers, as the work in hand necessitates. The whole of the gangs are under the control of a general foreman who is directly responsible to the Mains Superintendent for all outside work. In addition, we have, of course, storemen, motor lorry drivers, syphon pumpers, &c., the whole constituting a unit of about 70 men.

At present this department deals with something like 355 miles of main pipes ranging from 3 in. to 24 in. diameter, to which are connected 70,000 consumers and public lamps. Illustrating the activities of the department in the post-war period, I might say that since Jan. 1, 1919, to date we have added something like 25,000 consumers, necessitating the laying down of 117 miles of main pipes.

In common with all public utility undertakings, we have of late years had to face vastly increased costs for distribution. The use of concrete and other special compositions for road surfacing has increased renewal costs enormously, and in the case of new roadways has necessitated the provision of mains in each footway, the one acting as a feeder for the second or service main. Although the first cost of providing dual mains is in many instances more, this method has advantages such as saving in the length of wrought iron service pipes, ease in getting at the main, and reduced expense in renewal of main or service pipe when such a course becomes necessary.

As in the case of most undertakings, and excepting new feeder mains, the bulk of our mainlaying to-day is required for new housing schemes in the suburbs. In forming the roadways, we find considerable divergence of opinion among the different authorities. In some cases concrete roads with tarmac or cement footways are constructed before any houses are built. Again in other instances only rough ballast roadways are formed, the surface being finished off when building is completed. We prefer the latter method as our pipes can be put in as houses are erected and renewal of costly footways obviated. In the case of concrete roadways being formed prior to the commencement of building, we put in steel crossover pipes, if possible in one length from footpath to footpath, a marker being placed at each end so that as the footpath mains go forward the crossover can be easily picked up and connected to the system. All crossover pipes are concreted in as protection against corrosion.

Opinions differ as to the use of cast iron or steel for main pipes. In our case we consider the kind of ground. If made up and subsidence is likely at some future date, we use steel, but, generally speaking, we prefer cast iron, which, under normal conditions, has stood the test of time so well. As an instance of this, last year we had to cut out an 18-in. main, which had been in the ground for 70 years, and it was still in excellent condition and good for a long period to come.

In dealing with steel pipes, the utmost care is necessary to protect the outer wrapping, and, in laying, we consider it advisable to give further protection by concreting in. For this purpose we use a mixture of one part of cement to five parts of stone dust.

We have of late had our attention drawn to cement asbestos pipes which, we are informed, are extensively used, especially for water, in various parts of the country. The great advantages claimed for this class of pipe are freedom from corrosion and ease in jointing and handling. It would be interesting to hear if any of our members have practical experience of these extending over a number of years. From my point of view, the advantages previously named would be outweighed if there were the least likelihood of the pipes being easily fractured when laid with the usual cover which we allow for cast iron.

Careful records are kept of all our main pipes. For the general use of the department we have plans on a scale of 88ft. to the inch and, in addition, at our head office the same information is contained on L/2500 ordnance maps made up in book form. All these plans are kept up to date monthly.

The same remarks apply to valves and syphons. All syphons are attended to at least once a fortnight, and valves, bridge mains, &c., at regular intervals, records of each inspection being kept.

Services.

Of recent years our service work has been considerably increased through the constant development of housing schemes by local authorities and private enterprise. Since 1921 we have put in an average of 1,500 services annually.

Generally, the gas meter is fixed in the hall or under the stairs in the front portion of the house. This position is the most suitable for our purpose, although a number of Council houses of the non-parlour type have been built in terraces or blocks, in which case the gas meter is fixed on the wall of the kitchenette.

In the latter case the service pipe has to be run the full length of the house under the floor and generally supported on the division walls and stanchions put in by the Gas Company. Although this is a source of danger in the case of an escape of gas, we cannot see any way out of the difficulty, as the position of the meter is fixed by the authority for the convenience of the tenant.

It is my Company's practice to lay coated and wrapped pipe to all premises where the ground is good—all fittings are of steam quality—the exposed joints in the pipes, bends, and uprights being wrapped with a good protective bandage. Where the ground is detrimental to pipes, steam quality tubing is laid and protection afforded with

concrete made up of one part of cement and five parts of stone dust.

To carry out this work properly, we trough the pipes, using 9 in. by 3 in. spruce cut into 17 rips and 9 in. by 4 in. cut into 14 rips, the troughs being made up ready at the works to be taken on to the district as required. Services have been protected in this way since 1928 and, having had occasion to disturb a few for the insertion of branches, we have always found them in excellent condition.

One-inch diameter pipe is used for most of our service work, the size being increased according to the distance from the main to the meter. All tubing is oiled inside with linseed oil at the works before being sent out to the service layer. Main cocks on the ordinary service are ¾ in. and of the fullway thumb-piece pattern.

Renewal work is a much more costly job and is often carried out under very unsuitable conditions compared with the laying of pipes to premises in course of erection. We have discovered a number of service pipes which have become perished at the point where they pass through the footing walls of consumers' premises. In old buildings, where the walls are solid, this has no doubt been caused by dampness and builders' black mortar used in the brick and stone work. The same trouble has arisen in cavity walls, but an escape of gas in a building so constructed might be more serious.

In an endeavour to prevent pipes becoming corroded where they enter through walls we now thread them through a 2-in. land drain pipe, the hole in the wall being carefully reinstated and the space between the service and drain pipe filled with cement.

Throughout our area we work on very amicable terms with the various local authorities, who keep us posted well in advance of work such as private improvements, road repairs, projected new roadways, alterations to bridges, &c., and, on our part, we always endeavour to assist them by executing renewal work, main extensions, and so on, in advance.

We have record books of our existing mains and services over a period of years and can thus trace the exact nature of work done to any particular pipe, and, in the case of reforming or repairs to roadways, we extract the necessary information from our records and, prior to the roadwork being started, examine and where necessary relay the main or, alternatively, any service pipes which we know have not been attended to within a reasonable time.

Reinstatement.

In the case of tar macadam roadways we always carry out reinstatement ourselves, the trenches being well punned and then gone over with a light horse roller and finally finished off with a coating of tarmac when sufficiently consolidated. Reinstatement of footways is also done by ourselves. The footways are temporarily relaid by the service layer and finished off by the paviour, who also inspects and repairs any holes made in walls by the service layer.

In the case of Trinidad and other patent surfaces, final reinstatement is carried out by the local authorities, to our order. We take particular care in filling and consolidating these trenches, which we finish off with a layer of concrete and a coating of tarmac—the tarmac being easily removable when the final surface is put on.

Although it must be admitted that reinstatement to-day is a costly matter, it pays to carry out this work promptly and in a proper manner, as not only is inconvenience and annoyance to consumers avoided but the likelihood of unnecessary friction with local authorities is prevented.

Inspection of Mains and Services.

We endeavour to inspect all ground openings made by other authorities in our area of supply, and keep careful records of the condition of any of our pipes that may become exposed. The condition of the pipes is classified, the slightest escape remedied at once, and those shown as poor renewed at the earliest possible moment. In the last twelve months over 900 services were thus examined.

In ground openings we experience most trouble in the laying of surface water and other drains, in many cases done by contractors who are here to-day and gone to-morrow, and, although we always insist on our pipes being adequately supported and protected, we have had cases of subsidence occurring years after the ground has been filled, with consequent damage to our mains and services.

The use of mechanical trench diggers and rammers is another source of anxiety to us, and when we know an excavator is going to be used we always endeavour to provide the contractor with the position of our pipes. Despite this precaution accidents will occasionally happen. In the case of mechanical rammers being used on a longitudinal trench, the position of our main and services is likewise indicated to those in charge of the work.

Escapes should receive priority over any other work and when one is reported immediate attention should be given. On a number of occasions we have found that what has been reported as slight has, on examination, proved to be serious. During working hours reports of escapes can be looked into fairly easily, but between 5 p.m. and 7 a.m. a different state of affairs prevails. We have found it advisable in Cardiff to keep a light motor lorry on the works fully equipped with all tools available with driver throughout the night and always ready in case of emergency. In addition, we keep service trucks, complete with shovels, picks, and tools, at other points on the district, so a spare is available should necessity arise. Our emergency outfit, in addition to ordinary tools, includes breathing apparatus, rubber gloves, bronze picks, and two 12-volt portable lamps.

Discussion.

The PRESIDENT (Mr. J. H. Chapman, of Swansea) asked why two jointers were required, and if gas quality tubing was used in good ground. Also why ¾ in. cocks were used on 1 in. services. Mr. Chapman stated that in Swansea they had trouble with contractors using trench digging machines, causing damage to their plant. He spoke of the cutting of spun pipes, remarking that they were difficult to cut.

Mr. E. E. MOORE (Swansea) remarked that in the case of roadways having only one main they had found the "main finder" a great help when laying new services. They had difficulty during frost with a number of broken mains. He thought that a great number of services became holed through the action of electrolysis.

Mr. H. L. JONES (Neath) thought asbestos cement pipes would be dangerous in ground liable to subsidence.

Mr. D. E. WILKINS (Swansea) stated that where pipes passed under houses for the meter to be fixed in the kitchenette they always fitted a cut-off valve outside in the pavement.

Mr. C. B. J. CHURCH (Newport) enquired if it was the practice to fit valves in the pavement on services entering shops and other large buildings, and whether private syphons were inspected during the syphon pumpers' round.

Mr. C. B. FELTON (Newport) asked for further particulars of the records kept at Cardiff of mains and services, and whether they found any splitting when drilling spun pipes.

Mr. H. MAYCOCK (Abertillery) enquired what type joint was used in Cardiff and at what distance steel crossover pipes were put in. He also asked what protective wrapping was used on steel mains and for further particulars in regard to concreting service pipes.

Mr. A. E. PASK (Caldicot) enquired whether the oil used on the inside of service pipes was applied hot or cold. He proposed a vote of thanks to the Author. Mr. MAYCOCK seconded.

The Author's Reply.

Mr. WILLIAMS, in reply, said they had two jointers in the mains gang, one being a skilled hand, while the other acted as an "assistant jointer," being a younger man, who would ultimately become a skilled jointer. Gas quality tubing was used in good ground, but in bad ground steam quality was used, all fittings being of steam quality. Main cocks ¾ in. in size were fitted on 1 in. services by means of a reducing socket and barrel nipple. Originally all service pipes were ¾ in. diameter, and a great deal of trouble arose with "chokers." He thought that a ¾ in. cock was quite sufficient on the ordinary domestic supply, as the internal carcassing was only ⅝ in. or ¾ in. compo. In Cardiff a number of districts had been built on made ground, and it was in these areas where most trouble with mains and services was experienced. They had found that in this type of ground, usually made up of ashes and household refuse, that the life of coated and wrapped pipe was about 8 years. It was now their practice to concrete the services in these areas. During the last 8 years they had not had any cases of electrolysis.

Replying to Mr. Church, all services to business premises were fitted with valves outside in the footway, so that in case of fire the gas could be shut off. All private syphons were inspected by the syphon pumpers.

In reply to Mr. Felton, the record of mains was kept in the "Parliamentary book," and the "service record book" was made up from the dockets sent in by the service layer. The record contained the nature of work done and the date when the service was laid. This record had been kept since 1926. They had had no cases of splitting when drilling spun pipes. Replying to Mr. Maycock, he said that run lead joints were used on cast iron mains. With steel tubes lead yarn was used with a run lead joint. Steel crossover pipes were laid under the proposed concrete roads at the narrow portion behind the radius at the junction of the roadway. The protective wrapping on steel tubes was put on by the makers at their works. It was usually hessian dipped in a hot bitumen solution. They wrapped the joints with a good protective bandage. For estimating purposes concreting 1 in. service pipes they allowed 1 lb. cement and 5 lb. stone dust per foot of service pipe.

Replying to Mr. Pask, Mr. Williams said the oil used for service pipes was applied cold.

Gas Undertakings' Results

Berwick.

The annual report of the Berwick and Tweedmouth Gaslight Company shows a profit in revenue account of £2,594, and this, added to the available balance of profit and loss, gives a total of £4,101. From this, the Directors recommend the payment of a dividend of 5½%, which will absorb £2,151, leaving a balance of £1,950 to be carried forward.

Bradford.

The report by the Engineer and Manager, Mr. G. E. Currier, upon the working of the Bradford Gas Department for the year ended March 31, 1937, states the gross income for the year amounted to £478,630, and the gross expenditure to £412,956, showing a gross profit of £65,674; and after providing for the net revenue charges there is a net profit of £22,914. In comparison with the figures for the preceding year, the gross income is increased by £26,695, and the gross expenditure by £23,860, while the net revenue charges are more by £1,046. The net profit of £22,914 compares with £21,125 earned during the preceding year. The total sales of gas for the year have been 1,982,339,000 cu.ft. as compared with 1,947,668,000 cu.ft. the previous year, an increase of 34,671,000 cu.ft., or 1·78%. The total quantity of gas made was 2,105,933,000 cu.ft. as compared with 2,092,553,000 cu.ft. during the preceding year, being an increase of 13,380,000 cu.ft., or 0·64%. The coal gas made was 1,940,758,000 cu.ft., equal to 15,241 cu.ft. per ton of coal carbonized, as compared with 15,327 cu.ft. per ton last year, and, additionally, there was produced 165,175,000 cu.ft. of carburetted water gas as compared with 191,876,000 cu.ft. in 1935-36. The unaccounted-for gas was 5·87%. The total receipts for residuals are £94,979, or £14,945 more than last year. On the expenditure side coal has increased by £6,346, the total cost of the quantity carbonized (including carriage and handling charges) being £118,126, or an average of 18s. 6·65d. per ton, against last year's figure of £111,780, or an average of 18s. 0·34d. per ton. The total mileage of mains is now 579. The quantity of gas used for street lighting purposes was 251,267,000 cu.ft. and the total number of gas lamps in use at March 31 was 12,944, compared with 12,842 a year earlier. The substitution of automatic for manual control is still proceeding, and there are now 10,650 lamps converted. The total number of appliances sold during the year was 8,705, this being an increase of 625 over the previous year.

Buckhaven and Leven.

Reporting to the Buckhaven and Leven Gas Commissioners, Mr. H. A. Aitken, General Manager, stated that the year's operations showed a profit of £369, which compared with £1,612 a year ago. Working expenses amounted to £26,337, as against £23,809 in the preceding year, the increased expenditure being chiefly attributable to the higher prices for coal, and the increased quantities of coal carbonized consequent upon the increase in gas output. Works maintenance account again included the sum of £1,000 towards plant replacement, while the sum of £488 was included in respect of cookers scrapped through obsolescence. Rates and taxes show an increase of £197 on the previous year. On the income side of revenue account there was the sum of £36,661, which compared with £34,877 a year ago, an increase of £1,784. Coke and tar show increased returns of £1,282 and £183 respectively. The gross profit of £10,324 compares with £11,068 carried to net revenue account a year ago. Net revenue expenditure totals £9,955 against £9,965.

Burntisland.

At a meeting of Burntisland Town Council last week, Mr. William Brown, Gas Manager, reported that during the year ended May 15 last, 2,730 tons of coal were carbonized, producing 49,375,000 cu.ft. of gas, the highest output at the works. The revenue from the sale of gas for the year was £7,652, and from the sale of tar and coke the total was £1,398.

Carlisle.

The annual report of the Engineer and Manager of the Carlisle Gas Department, Mr. J. E. Blundell, M.Inst.C.E., for the year ended March 31, 1937, states the sale of appliances at the showroom is still on the up grade, showing an increase of 2% over the corresponding year 1935-36, and 18·7% over the year 1934-35. The quantity of gas made and sold continues to increase, the respective figures being 684,302,000 cu.ft. and 629,573,080 cu.ft. as compared with 665,511,000 cu.ft. and 622,279,323 cu.ft. for the year 1936. The yield of coke and breeze—23,596 tons as against 23,099 tons for the preceding year—is equal to 12·9 cwt. per ton of coal carbonized, and the quantity sold, 15,223 tons, has realized £13,918, an increase of £2,431 over last year's sales figure. The financial results for the year after providing for income-tax, loans repayments, &c., show a net profit of £4,149, as against £5,204 for the preceding twelve months.

Heywood.

The annual report of Mr. G. W. Broughton, Engineer and Manager of the Heywood Gas Department, for the year ended March 31, 1937, states that the gross revenue amounted to £31,395, and the gross expenditure (excluding loan charges, &c.), £25,571, leaving a gross profit of £5,824. Loan charges and income-tax amounted to £7,900, and after crediting £1,468 interest from investments, there is a net loss of £608, as against a net profit last year of £1,864. The total quantity of gas manufactured was 743,332·5 therms, of which 15,795 was carburetted water gas. During the year 8,759 tons of coal have been carbonized, giving an average make per ton of 83·06, against 82·02 therms last year. The total sales of gas amounted to 646,698·48 therms, a decrease of 5·61% on the previous year. The "unaccounted-for" gas figure has fallen from 11·69 to 11·39%. The quantity of coke and breeze sold was 2,710 tons, as against 3,907 tons in 1936, the net receipts showing a decrease of £649.

Inverurie.

It was reported at the annual meeting of Inverurie Gas Company that the year had been a very successful one. Provost Taylor, Chairman, said the income for the year exceeded that of the previous year. The usual dividend was paid.

Kendal.

The report of the Engineer and Manager of the Kendal Gas Department, Mr. T. Crowdy, states that for the year ended March 31, 1937, there was an increase in sales of gas of 3%. The net profit was £1,185. Coke sales showed an increase of £100, and tar £144. Coal cost the Department £800 more, due to increases in prices and canal dues. Heavy expenditure which was charged to revenue included re-roofing of the retort house, mains, and services, painting of holders, and retort house framing. Increased revenue from public lighting amounted to £98; out of 650 public lamps, 610 are lighted by gas. Several miles of high-pressure gas main has been laid for the Staveley district, which was a capital charge. Over 300 new cookers were added to the books, *plus* gas fires, wash boilers, &c.

Leicester.

The annual report of the Engineer and Manager of the Leicester Gas Department, Mr. James Mitchell, M.I.Mech.E., for the year ended March 31, 1937, states the total quantities of coal carbonized and oil used during the year were 125,691 tons and 268,267 gallons, respectively. The thermal yield obtained per ton of coal carbonized was 88·59, or nearly 1½ therms better than the previous year's figure. The net receipts from coke, tar, and sulphate of ammonia together show an increase as compared with the figure recorded for last year. The gas made during the year totalled 2,632,235,000 cu.ft. The total quantity of gas delivered during the year was 2,633,384,000 cu.ft. The gas sold and accounted for during the year amounted to 2,557,090,832 cu.ft., and showed an increase of 10,062,100 cu.ft., or 0·40%, when compared with the corresponding figure last year. This increase was secured over and above the 82 million cu.ft. increase obtained last year. The total length of gas mains laid at March 31 amounted to 612 miles, some 50 miles of new main having been laid during the year. The increase in the number of consumers connected to the mains during the year amounted to 3,513, of which 1,086 were consumers transferred from the Syston and Thurmaston Gas Company. The number of gas consumers in the newly acquired Syston area had already increased by over 60%. The total number of consumers at the end of the year was 91,723.

Loughborough.

The annual report upon the Loughborough Gas Undertaking for the year ended March 31, 1937, states the gross revenue amounts to £39,359, and the gross expenditure (less interest and sinking fund charges), £26,638, leaving a gross profit of £12,721, or an increase compared with last year of £1,973. Including the sum of £11,747, being income-tax, net interest and sinking fund charges, &c., the year's working has resulted in a net profit of £974. The total quantity of gas manufactured was 157,935,000 cu.ft., while during the year 8,276 tons of coal were carbonized, giving a yield of 19,083 cu.ft., equivalent to 85·9 therms per ton. Last year, when operating the old horizontal retort installation, 11,247 tons of coal were carbonized in the production of 145,865,000 cu.ft. of gas, giving an average yield of 12,924 cu.ft. (58·2 therms) only. The total sales of gas amounted to 140,263,400 cu.ft., an increase over 1936 of 8,903,500 cu.ft., equal to 6·78%. The total receipts from residuals, after deducting all labour and carriage charges, amounted to £5,562, equal to a return of 13s. 5·28d. per ton of coal carbonized, as compared with 9s. 6·57d. per ton in 1936. The sale of gas appliances through the showroom continues to exceed all expectations and during the period under review has reached a total value of £9,331, an average of £179 per week, compared with £7,886 and £151 respectively in 1936. During the year orders were taken for 783 cookers, 110 washing machines and boilers, 188 fires and radiators, 70 water heaters, and 83 other miscellaneous appliances.

Rotherham.

The financial result of the year's working of the Rotherham Gas Department is a gross profit of £34,712, and after payment of interest charges, redemption of debt and income-tax, there remains a net profit of £5,174, as compared with a net loss of £172 last year. The total expenditure during the year has been £80,589 against £81,094 during the previous year, and the income has been £115,301 compared with £106,179 last year. The expenditure on capital account has been £25,000, principally on the new holder under construction, and the net capital indebtedness at March 31 was £199,014, being equal to £132 per million cu.ft. of gas sold. The gas sold has been 1,509,870,000 cu.ft. against 1,325,141,000 cu.ft. during the previous year, being an increase of 13·94%. Of this amount, 75% was registered by ordinary meter, 19% by prepayment meter, and the remaining 6% by public lamps. The number of meters now in use has increased by 732 over the previous year. This is made up of 599 prepayment and 133 ordinary.

Workington.

The annual report on the Workington Gas Department for the year ended March 31, 1937, states the gas produced was a record, being 212,542,000 cu.ft., or 913,931 therms, an increase of 0·57% over the previous year. The gas produced per ton of coal carbonized was 20,121 cu.ft., equivalent to 86·52 therms; the gas sold per ton of coal carbonized being 19,062 cu.ft., or 81·97 therms. The average price paid for coal during the year was 23s. 11d. per ton, which is 1s. 5d. per ton more than the previous year, a further advance of 1s. per ton taking effect in August last year, making 2s. per ton advance over the past two years; an additional increase in coal prices is to come into operation at the expiration of current contracts in August of this year, hence the expenditure on coal will show a further increase at the end of the next financial year. The net return from the sale of residuals is 33·77% of the cost of coal as against 36·18% for the preceding year. The financial results show a net profit of £1,253 against a net profit of £2,286 for the previous year.

The Institution of Gas Engineers

RESULTS OF 1937 EXAMINATIONS

The undermentioned Candidates were successful in the 1937 Examinations in Gas Engineering and Gas Supply of The Institution of Gas Engineers, held under the Education Regulations of The Institution of Gas Engineers, as approved by the Government Education Departments of Great Britain and Ireland, and the City and Guilds of London Institute.

The Results do not include Candidates (*a*) who withdrew before the Examination, or (*b*) who, having Second Class Certificates, re-sat and failed to secure First Class Certificates, or (c) whose Examination has not been completed.

Appended is the Report of the Board of Examiners on the 1937 Examinations.

Comparative Statistical Schedule of the 1936 *and* 1937 *Examination Results.*

Examinations.	1936.					1937.				
	First Class with Distinction.	First Class.	Second Class.	Failed.	Total.	First Class with Distinction	First Class.	Second Class.	Failed.	Total.
External—										
Diploma in Gas Engineering (Manufacture)	..	4	4	1	9	..	4	1	1	6
H.G. Gas Engineering	..	13	15	7	35	..	8	13	5	26
O.G. Gas Engineering	..	4	14	14	32	1	5	8	14	28
O.G. Gas Engineering (single subject)	..	..	..	..	..	..	..	..	..	..
Diploma in Gas Engineering (Supply)	..	1	..	..	1	..	1	2	..	3
H.G. Gas Supply	2	4	7	8	21	..	6	5	1	12
O.G. Gas Supply	2	4	16	5	27	..	7	22	8	37
O.G. Gas Supply (single subject)	..	3	2	..	5	..	9	5	..	14
Internal—										
H.G. Gas Engineering	1	23	27	17	68	1	8	21	11	41
O.G. Gas Engineering	2	9	22	14	47	1	5	38	11	55
O.G. Gas Engineering (single subject)	..	3	1	..	4	..	5	6	1	12
H.G. Gas Supply	2	18	18	19	57	4	14	26	14	58
O.G. Gas Supply	9	25	55	36	125	3	13	42	33	91
O.G. Gas Supply (single subject)	4	9	2	2	17	2	6	6	..	14
Total	22	120	183	123	448	12	91	195	99	397

EXTERNAL CANDIDATES (92).

Diploma in Gas Engineering (*Manufacture*) (5).

Class.	Name.	Town.	Subject of Thesis.
First ...	Gorman, E. F....	London ...	"The Application of Low Temperature Carbonization to Gas Works Practice."
,, ...	Jones, S. T. ...	Falkirk ...	"The Use of Glycerin for the Partial Dehydration of Town's Gas."
,, ...	Mitchell, J. K....	Brighouse ...	"A Review of Some Recent Developments in Gas Manufacture."
,, ...	Rimmer, G. J....	Hinckley ...	"Gas Works Liquors and Their Disposal, with Special Reference to Results of Electro-Tar Precipitation."
Second ...	Tidball, F. N. ...	Coventry ...	"Retort House Design."

Higher Grade Certificate in Gas Engineering (21).

Class.	Name.	Town.
First ...	Buchanan, I. P. J. ...	Wellington, N.Z.
,, ...	Clark, L. J. ...	London
,, ...	Clayton, R. S. ...	Hereford
,, ...	Findon, W. H. C. ...	Teddington
,, ...	Foston, R. H. ...	Torquay
,, ...	Lennie, K. S. ...	Mackay, Australia
,, ...	Petch, G. H. ...	Southampton
,, ...	Sumner, A. E. ...	London
Second ...	Ashton, J. H. F. ...	Preston
,, ...	Burke, C. E. ...	Belfast
,, ...	Draper, T. G. ...	Horley
,, ...	Heath, C. W. ...	Longton
,, ...	Hempsall, N. W. ...	Newark
,, ...	Henderson, W. M. ...	Cowdenbeath
,, ...	Hollingworth, R. A. ...	Cleveleys
,, ...	Macdonald, J. P. A. ...	Folkestone
,, ...	Milne, H. S. ...	Worcester
,, ...	Ormerod, S. P. ...	Bridlington
,, ...	Tunnicliff, K. ...	Malvern
,, ...	Pedler, T. W. ...	Exeter
,, ...	Whiting, R. ...	Bromley

Ordinary Grade Certificate in Gas Engineering (14).

Class.	Name.	Town.
First	Ashworth, S.	Darwen
,,	Bowles, F.	Bristol
,,	Cole, G. H.	Weston-super-Mare
,,	Horrod, S. A. J.	Swindon
,,	*Johnson, W. H.	Aldershot
,,	Meade, S. G.	Tenbury
Second	Armitage, S.	Bristol
,,	Blowers, F. J.	Lowestoft
,,	Grundy, J. M.	Bolton
,,	Heeley, G. W.	Sittingbourne
,,	Humphries, G. D.	Blackburn
,,	Jessop, W. R.	Lewes
,,	Kendrick, J. F.	Llandudno
,,	Mason, C. H.	Wellingborough

* With Distinction.

Diploma in Gas Engineering (Supply) (3).

Class.	Name.	Town.	Subject of Thesis.
First	Bell, F.	Liverpool	"An Installation of Gas and Steam Equipment in a Municipal Kitchen."
Second	Hawkings, B. G. H. J.	Plymouth	"The Utilization of Electricity in Gas Supply Practice."
,,	Warne, G. G.	Portsmouth	"Gas Distribution and Consideration of Rust Deposits in Mains and Services."

Higher Grade Certificate in Gas Supply (11).

Class.	Name.	Town
First	Foston, R. H.	Torquay
,,	Foulds, R. W.	Southport
,,	Marwick, J. A.	Portsmouth
,,	Pickthall, T. W.	Keighley
,,	Reid, A. C.	Leeds
,,	Smith, J.	Workington
Second	Croad, G.	Hebden Bridge
,,	Gillespie, A. V.	Dublin
,,	Griffiths, H. W. G.	Portsmouth
,,	Henderson, W. M.	Cowdenbeath
,,	Whitehurst, F. L.	Cheadle

Ordinary Grade Certificate in Gas Supply (29).

Class.	Name.	Town.
First	Brake, N. T.	Bexhill-on-Sea
,,	Clapham, T. W.	Bristol
,,	Harrison, R. K.	Southampton
,,	Hill, D. A.	Plymouth
,,	Rimmer, G. J.	Hinckley
,,	Simpson, E.	Burnley
,,	Wait, N. T.	Ryde
Second	Beech, J.	Kidsgrove
,,	Berry, A. G.	Worthing
,,	Chandler, D. F.	Brighton
,,	Clayton, R. S.	Hereford
,,	Cox, F. G.	Nottingham
,,	DeQuincey, W. B.	Norwich
,,	Forsch, W.	Longton
,,	Haycraft, D. B.	Nottingham
,,	Heath, C. W.	Longton
,,	Hughes, T. K.	Nottingham
,,	Ivens, R.	Weston-super-Mare
,,	Jackson, T. W.	Bournemouth
,,	Johnson, F. J.	Bristol
,,	Knight, L. H.	Portsmouth
,,	Monk, L. G.	Snodland
,,	Osmotherley, R.	Holyhead
,,	Scourse, A. W.	Bristol
,,	Sperring, W. H.	Weston-super-Mare
,,	Stevenson, J.	Leek
,,	Venn, D. P.	Bristol
,,	Westmacott, M. H.	Sunningdale
,,	Winter, C. R.	Nottingham

Ordinary Grade (Single Subject) Examination in Gas Supply to qualify to sit for the Diploma Examination in Gas Engineering (Manufacture) (9).

Class.	Name.	Town.
First	Benstead, T. W.	Maldon
,,	Birks, H. E. S.	Goole
,,	Deacon, V. H.	Birmingham
,,	Humphries, G. D.	Blackburn
,,	Monson, G. E.	Plymouth
,,	Price, L. P.	,,
,,	Ricketts, T. S.	Hertford
,,	Topping, J.	Carlisle
,,	Young, C. A.	Shrewsbury

INTERNAL CANDIDATES (188).

Higher Grade Certificate in Gas Engineering (30).

Class.	Name.	Centre.
First	Edwards, E. J.	Regent Street
,,	Gale, W. A.	Birmingham
,,	Pickthall, T. W.	Bradford
,,	Richardson, P. G.	Plymouth
,,	Robinson, C. F.	Regent Street
,,	Robinson, R. F.	,,
,,	Sanders, M. J.	Plymouth
,,	*Sloman, K. F.	,,
,,	Taylor, J. B.	Manchester
Second	Addison, R. A.	Regent Street
,,	Benyon, F. E.	Manchester
,,	Christie, J.	Kirkcaldy
,,	Clark, J. R.	Newcastle-upon-Tyne
,,	Fyfe, D.	Kirkcaldy
,,	Greenway, N. H.	Cardiff
,,	Hastie, D.	Edinburgh
,,	Healey, A.	Manchester
,,	Irvin, S. G.	Newcastle-upon-Tyne
,,	Jennings, A. P.	Leeds
,,	Johns, F. S.	Cardiff
,,	Kay, G. W.	Leeds
,,	Locke, L. H. W.	Dundee
,,	Phillips, W. G.	Regent Street
,,	Ross, T.	Kirkcaldy
,,	Stringer, D. G.	Regent Street
,,	Thornton, D. H.	,,
,,	Unsworth, R. H.	Wigan
,,	Wilkinson, J.	Leeds
,,	Wilson, J. F.	Dundee
,,	Wright, S. E.	Newcastle-upon-Tyne

* With Distinction.

Ordinary Grade Certificate in Gas Engineering (44).

Class.	Name.	Centre.
First	*Dickson, A. E.	Sheffield
,,	Downs, F. S.	Regent Street
,,	Mort, L.B.	Blackpool
,,	Rigden, H. L.	Westminster
,,	Robertson, T.	Kirkcaldy
,,	Spray, P. H. G.	Cardiff
Second	Barnsley, V.	Leeds
,,	Beake, R. C.	Bath
,,	Bennett, P. V.	Regent Street
,,	Bentley, G. A.	Huddersfield
,,	Bowden, K. L.	Manchester
,,	Brown, H.	,,
,,	Cousens, D. F.	Regent Street
,,	Date, D. W.	Bath
,,	Day, J. G.	Wigan
,,	Dodd, A. E.	Derby
,,	Dyche, G. H.	,,
,,	Ernest, K. M.	Cardiff
,,	Fisher, G. R.	Liverpool
,,	Fornachon, G.	Manchester
,,	Francis, D.	Westminster
,,	Hartley, M. L.	Leeds
,,	Henley, R. A. W.	Regent Street
,,	Hollingshead, C. R.	Liverpool
,,	Ironside, R. S.	Bath
,,	Jordan, R. E.	Westminster
,,	Lovett, N. F.	Leicester
,,	McFadyen, A.	Glasgow
,,	McIntyre, I.	Birmingham
,,	Nelson, L.	Hull
,,	Newall, R.	Liverpool
,,	Norrie, F. B.	Dundee
,,	Plimsoll, J. H.	Derby
,,	Reber, R. J.	Regent Street
,,	Roberts, D.	East Ham
,,	Sherratt, J.	Derby
,,	Smith, J. F.	Manchester
,,	Smith, R. B.	Newcastle-upon-Tyne
,,	Smith, W. G.	,, ,, ,,
,,	Spence, G. R.	Leeds
,,	Swift, R. H.	Hull
,,	Webb, R.	Leeds
,,	Walsh, B. L.	Birmingham
,,	Wilson, W. M.	Glasgow

* With Distinction.

Ordinary Grade (Single Subject) Examination in Gas Engineering to qualify to sit for the Diploma Examination in Gas Engineering (Supply) (5).

Class.	Name.	Centre.
First	Ireland, N. W.	Westminster
,,	Hedges, H. R.	,,
,,	Maylam, J. B.	,,
,,	Roberts, F.	Bradford
,,	Emrys-Roberts, G. W.	Westminster

Higher Grade Certificate in Gas Supply (44).

Class.	Name.	Centre.
First	Arnold, C. P.	Westminster
,,	Barr, R. B.	,,
,,	Beels, F. D.	Birmingham
,,	*Collis, E. G.	Westminster
,,	Hunter, P. D. V.	,,
,,	Jewers, V. C. P.	,,
,,	Langford, R. G.	,,
,,	Meadows, S. L.	East Ham
,,	Napier, T. P.	Kirkcaldy
,,	Prestage, C. H.	Westminster
,,	*Ramsey, C. M.	,,
,,	Rolls, C. G. S.	,,
,,	Salusbury, R. C. W.	,,
,,	Smith, H. R.	Birmingham
,,	*Smith, J.	Westminster
,,	Squires, S. E.	Birmingham
,,	*Taylor, T. H.	Westminster
,,	Wright, H. T.	,,
Second	Brown, A.	Kirkcaldy
,,	Cassell, E.	Westminster
,,	Cranmer, A. G.	Birmingham
,,	Ehlen, L. B	East Ham
,,	Ellis, J.	Birmingham
,,	Galley, D. H.	Westminster
,,	Graham, J. C.	Newcastle-upon-Tyne
,,	Grimshaw, H.	Manchester
,,	Higgs, A.	Tunstall
,,	Holdaway, J. W.	Westminster
,,	Huett, T. R. C.	East Ham
,,	Jennings, A. C.	Westminster
,,	Livingstone, T. B.	Glasgow
,,	Maddocks, D. N.	Birmingham
,,	Maddocks, F. C.	,,
,,	Mitchell, A. A.	Edinburgh
,,	Nangle, J.	Manchester
,,	Pears, G. E.	Westminster
,,	Pocock, G. E.	,,
,,	Robson, G. W.	Newcastle-upon-Tyne
,,	Rowe, N.	Tunstall
,,	Scott, W. A.	Newcastle-upon-Tyne
,,	Sutcliffe, W.	,, ,, ,,
,,	Thurley, R. J. B.	Westminster
,,	Weatherley, W. E.	Newcastle-upon-Tyne
,,	Witt, A. L.	Westminster

*With Distinction.

Ordinary Grade Certificate in Gas Supply (58).

Class.	Name.	Centre.
First	Andrews, H. G. A.	Wandsworth
,,	Bate, C. A.	Westminster
,,	*Doughty, F. B.	East Ham
,,	Dyson, R.	Huddersfield
,,	*Fox, C. L.	Westminster
,,	Green, R. H.	East Ham
,,	Hill, W. R.	,,
,,	Jennings, Miss S. C.	Westminster
,,	Lockwood, F. W.	East Ham
,,	Pearson, C.	Westminster
,,	Pink, D.	,,
,,	Robertson, T.	Kirkcaldy
,,	Sage, E. R.	Dundee
,,	*Skingsley, A. A.	East Ham
,,	Toller, G. H.	Westminster
,,	Wright, J. A.	,,
Second	Bailey, J. E.	,,
,,	Brampton, J.	Birmingham
,,	Brook, G.	Huddersfield
,,	Brook, J.	Leeds
,,	Bubb, S. H.	Birmingham
,,	Buxton, A. H.	Westminster
,,	Clark, J. E.	Newcastle-upon-Tyne
,,	Cockhill, J. R.	Huddersfield
,,	Darling, C. G.	South-East London
,,	Dolding, A. C.	Westminster
,,	Eyre, N. C.	Birmingham
,,	Fowme, A. W.	,,
,,	Fraser, W. C.	Kirkcaldy
,,	Fry, R. J. H.	Wandsworth
,,	Gaunt, D.	Bradford
,,	Goulding, L. G.	Birmingham
,,	Grey, E. G.	Westminster
,,	Griffith-Jones, M. A.	,,
,,	Harlow, F. S.	,,
,,	Harris, E. J.	,,
,,	Heycock, D. J.	Cardiff
,,	Horseman, J. R.	Westminster
,,	Hungerford, W. C. P.	,,
,,	Kay, A. M.	,,
,,	McFadyen, A.	Glasgow
,,	Mason, J. I.	Bradford
,,	Mould, J. A.	Westminster
,,	Muir, K. E.	Cardiff
,,	North, K. R.	South-East London
,,	Oake, R.	Westminster
,,	Partridge, J. R.	,,
,,	Randell, R. J. A.	,,
,,	Spencer, J. W.	Tunstall
,,	Swinson, H.	Westminster
,,	Thorne, W. L.	Cardiff
,,	Trachtenberg, N.	Westminster
,,	Tranter, R. G.	Birmingham
,,	Tydeman, G. A.	Westminster
,,	Ward, J.	,,
,,	West, C. E. C.	South-East London
,,	West, D. E.	Cardiff
,,	White, A. W.	Westminster

* With Distinction.

Ordinary Grade (Single Subject) Examination in Gas Supply to qualify to sit for the Diploma Examination in Gas Engineering (Manufacture) (8).

Class.	Name.	Centre.
First	Crump, S. C.	Birmingham
,,	*Gorman, E. F.	South-East London
,,	Matthews, N.	Manchester
,,	Mayor, J. A.	Liverpool
,,	*Northen, B.	South-East London
,,	Perkin, A.	Manchester
,,	Phillips, G. T.	Birmingham
,,	Tidball, F. N.	,,

* With Distinction.

1937 REPORT OF THE BOARD OF EXAMINERS

The Board of Examiners has pleasure in submitting to the Gas Education Committee, for presentation to the Council of The Institution of Gas Engineers, its Report on the 1937 Examinations held under the Education Regulations of the Institution, as approved by the Government Education Departments of Great Britain and Ireland and the City and Guilds of London Institute.

During the year 1936-37, the members of the Board of Examiners and the Assessors appointed by the Council were:—

Major Courses.

Examiners: Robert Robertson, M.Inst.C.E. (Bristol)—Chairman; J. M. Campbell, J.P. (Margate), T. Carmichael, M.Inst.C.E., M.I.Mech.E. (Portsmouth), E. Crowther, M.Eng., A.M.Inst.C.E. (Manchester), F. H. Vince (London), and S. E. Whitehead, B.Sc., M.I.Mech.E. (Southampton)—Gas Engineering. W. A. Bishop (Croydon), D. Chandler (London), J. G. Clark (London), W. Dieterichs (London), H. R. Hems (Birmingham), and E. F. Keeble (Great Yarmouth)—Gas Supply.

Assessors: England and Wales: J. R. Bradshaw, B.Sc.Eng. (West Hartlepool)—Gas Engineering; J. G. Clark (London)—Gas Supply. West of Scotland: David Fulton (Helensburgh) and A. McDonald, B.Sc. (Motherwell)—Gas Engineering and Gas Supply. East of Scotland: J. Jamieson (Edinburgh) and J. W. Napier (Alloa)—Gas Engineering and Gas Supply.

Minor Courses and Gas Fitting Courses.

Examiners: S. E. Whitehead, B.Sc. (Southampton)—Gas Works Practice; E. F. Keable (Great Yarmouth)—Gas Supply Practice; R. N. LeFevre (London), A. G. R. Kennett (Margate), and J. Robertson (London)—Gas Fitting; W. E. Harrison (Birmingham)—Elementary Science.

ROBERT ROBERTSON,
Chairman,
Board of Examiners.

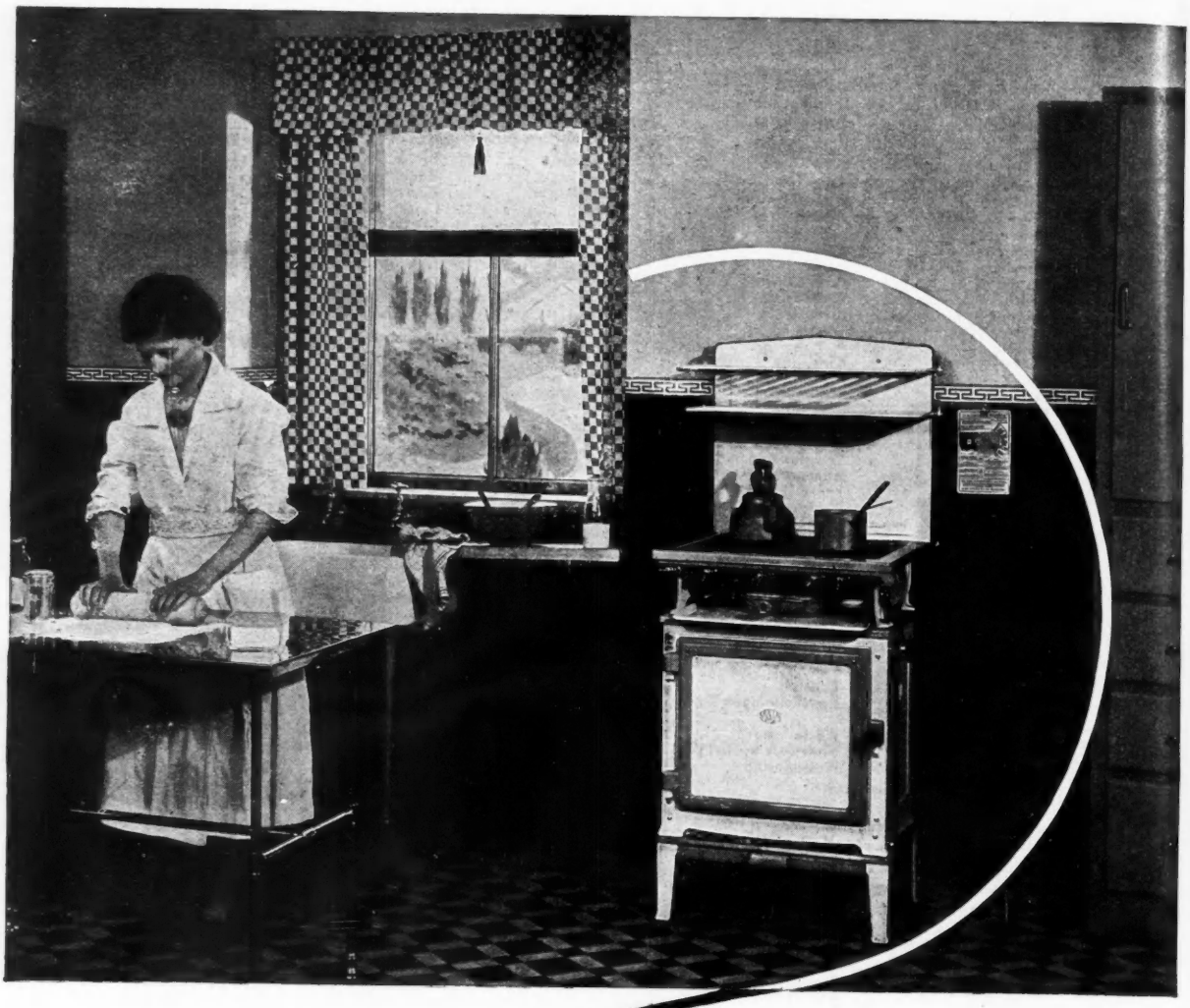
J. R. W. ALEXANDER,
Secretary,
The Institution of Gas Engineers.

1, Grosvenor Place,
London, S.W.1.
23rd June, 1937.

Gas Engineering—Ordinary Grade.

In the Examination for the Ordinary Grade Certificate in Gas Engineering, the work of the Internal Candidates was of a higher standard than in 1936, and there was a definite improvement in the sketches. It is encouraging to note that the Questions were answered in equal proportion, showing that the instruction given had been of a comprehensive character.

The papers submitted by External Students in Ordinary Grade Gas Engineering showed a decided improvement in



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knowledge, and sketching was definitely more carefully carried out, although lack of proportion was apparent in some cases. The Questions appeared to have been read carefully and to have been fully understood. Many Candidates who were able to answer Questions on the chemical side of the Gas Industry were unable to show the same degree of knowledge in Engineering matters, and vice-versa. The Questions on Water Gas Condensers and Gas Calorimeters were answered more effectively this year.

Gas Engineering—Higher Grade.

The standard of the work submitted by Candidates for the Higher Grade Certificate in Gas Engineering varied considerably. Some of the papers were good, Answers being satisfactory and sketches excellent. Many Candidates showed a lack of knowledge of first principles, which indicated that a satisfactory knowledge of ancillary subjects had not been acquired. Candidates, generally, were not familiar with the subjects of Gasholder Construction and the performance of Gas Engines. Many Candidates wasted time in writing out the Questions. There were two Overseas Candidates for the Higher Grade Examination in Gas Engineering.

Gas Engineering (Manufacture)—Diploma Grade.

The work submitted for the Diploma in Gas Engineering (Manufacture) was fairly good. It was evident that the Syllabus for the Diploma had been conscientiously worked through. There was a marked improvement in the conciseness of the Answers.

Gas Supply—Ordinary Grade.

The work submitted by the Internal Candidates for the Ordinary Grade Certificate in Gas Supply was good, and it was clear that the College Examinations had been carefully carried out. Vague expressions should be avoided.

The knowledge shown by External Candidates was of a high standard and indicated that the Syllabus had been covered and that the subjects were well understood. There was one Overseas Candidate for the Ordinary Grade Examination in Gas Supply.

Gas Supply—Higher Grade.

The work of the Candidates for the Higher Grade Certificate in Gas Supply showed that they were well informed regarding combustion, water-heating, refrigeration, and industrial work, but only a few Candidates attempted the Question on lighting. More use should be made of the knowledge of ancillary subjects when answering Questions in the main subject. Answers should be more concise.

Gas Engineering (Supply)—Diploma Grade.

There were three Candidates for the Diploma Examination in Gas Engineering (Supply).

Minor Course Certificates in Gas Works Practice and Gas Supply Practice.

The Report of the Examiners of the City and Guilds of London Institute on the 1937 Examinations for Minor Course Certificates in Gas Works Practice and Gas Supply Practice indicates that the Questions were generally understood. The sketches submitted by Gas Supply Practice Candidates had, on the whole, improved, but those submitted by Gas Works Practice Candidates continued to show lack of care. There was a marked improvement in the brevity of the Answers. The Answers to the Question on the Gas Engine were good.

Gas Fitting Certificates.

The Report of the Examiners of the City and Guilds of London Institute on the 1937 Examinations in Gas Fitting indicates that the number of entries has increased from 1,852 in 1936 to 2,141 in 1937. The Questions were well answered although the sketching still needs more attention. Students should be trained to set out their Answers in the form of concise notes, stating only the facts asked for.

Amendments to the Education Regulations

Education Regulations, 1937 Revision.—Copies are now available of the 1937 Revision of the Education Regulations (Publication No. 160), which embodies all amendments made up to and including June 22, 1937, and supersedes all previous issues.

The major amendment made to the Education Regulations is that the following provisions have been made to establish an Examination in Gas Supply for those not seeking or not otherwise qualified for Corporate Membership of the Institution:

1. (*a*) The standard of the Higher Grade Certificate in Gas Engineering (Supply) has been raised, so as to accord with the standard of the Higher Grade Certificate in Gas Engineering (Manufacture), and the Ancillary Subjects now required to be taken are of equivalent standard to those required for the Higher Grade Certificate in Gas Engineering (Manufacture).

   (*b*) The Higher Grade Certificate in Gas Engineering (Supply) is recognized, as the Higher Grade Certificate in Gas Engineering (Manufacture) is recognized, as complying with By-Law 14 (2) for the purpose of admittance to Associate Membership of the Institution.

   (*c*) A Candidate for the Higher Grade Examination in Gas Engineering (Supply) must, at the time of entry, be or have been suitably engaged on the practical side of the Gas Industry in Gas Engineering (Supply).

   (*d*) In view of the higher standard aforesaid for the Higher Grade Certificate in Gas Engineering (Supply), the three additional Ancillary Subjects for the Diploma Examination in Gas Engineering (Supply) are not required.

2. There is an Examination in Gas Supply, the Candidate for which need not be engaged on the practical side of the Gas Industry and the passing of which does not (i.) comply with By-Law 14 (2) for the purpose of admittance to Associate Membership of the Institution or (ii.) admit to the Diploma Examination in Gas Engineering (Supply).

   The Syllabus for the Certificate in Gas Supply is similar to that required for the Higher Grade Certificate in Gas Engineering (Supply), together with the Ancillary Subjects previously required for the Higher Grade Certificate in Gas Supply.

3. The Certificate in Gas Supply is convertible to the Higher Grade Certificate in Gas Engineering (Supply) by the Candidate taking the necessary additional Ancillary Subjects and, at the time of entry, being or having been suitably engaged on the practical side of the Gas Industry in Gas Engineering (Supply).

Publications.—Copies of the Forms of Application for Admission to the Institution, the 1937 Examination Question Papers, and the 1937 Revision of the Education Regulations of the Institution can be obtained from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

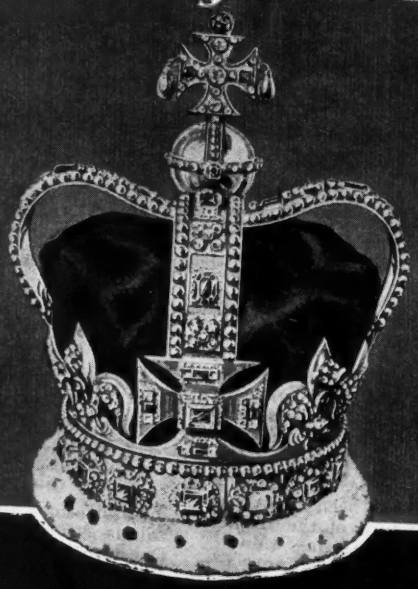
Dates of Examinations, 1938.—The next Examinations in Gas Engineering (Manufacture) will be held on April 30, 1938, and in Gas Engineering (Supply) and in Gas Supply on May 7, 1938. Applications to sit for either of these Examinations should be received by the Secretary not later than Feb. 28, 1938. The Education Calendar for 1938 will be available in December next.

Charles Hunt Memorial Medals.—The Charles Hunt Memorial Medals, generously endowed in 1930 by Mr. P. C. Holmes Hunt, on behalf of himself and his brothers and sisters, in memory of their father, are awarded annually to the Candidates who achieve the highest standards in the Examinations for the Diplomas in Gas Engineering (Manufacture) and in Gas Engineering (Supply), provided such standard satisfies the Council, on the recommendation of the Gas Education Committee and the Board of Examiners. No such recommendation has been made in connection with the 1937 Examinations.

Permission to Sit for Examination.—Permission to sit for an Examination is given only in respect of the Examination to be held next after such permission is granted. Students have to comply with the Regulations in force at the time of the Examination.

Qualifications for Membership of the Institution.—

George III
George IV
William IV
Victoria
Edward VII
George V
Edward VIII
George VI



In this, the Coronation Year of our Gracious King, George VI, we celebrate our 144th birthday, and are proud to record that, as leading manufacturers of gas works plant, we have been closely associated with the Gas Industry through eight reigns.

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Possession of the Diploma in Gas Engineering (Manufacture) or of the Diploma in Gas Engineering (Supply) admits to Associate Membership and is one of the qualifications necessary for admittance to Membership of the Institution. The Higher Grade Certificate in Gas Engineering (Manufacture) or the Higher Grade Certificate in Gas Engineering (Supply) are required, in the absence of the B.Sc. Degree in Gas Engineering, for election as an Associate Member. The Higher Grade Certificate in Gas Engineering (Manufacture) or Gas Engineering (Supply) is an alternative part qualification for admission to Associateship. The Ordinary Grade Certificate in Gas Engineering (Manufacture) or Gas Engineering (Supply) is an alternative part qualification for admission to Studentship of the Institution. Studentship ceases at the age of 24 years. If a Candidate for admission to Associate Membership is a Student of the Institution at the time of his application, he is eligible for election, if otherwise qualified, at the age of 21 instead of 25 years. Many Candidates for admittance to the Institution are unable to avail themselves of this advantage owing to their having omitted to seek election to Studentship.

Entries for Ancillary Subject Examinations.—Notification of an External Candidate's intention to present himself for Examination in a Subject ancillary to Gas Engineering (Manufacture) or Gas Engineering (Supply) must be received by the Secretary of the Institution not later than Jan. 15 in each year. External Students have to satisfy themselves that they are working to the Syllabus of the Examining Authority in whose area they reside and by whom they would normally be examined. Copies of such Syllabuses can be obtained from the Examining Authority. Candidates are responsible for entering themselves for the Examinations on receipt of instructions from the Institution to that effect, these being issued after the Secretary has received notification of the Candidate's intention to present himself for Examination in certain subjects.

Publication of Theses.—The copyright and property in all Theses is vested in the Institution. A Student desiring to publish his Thesis, or to present it at any Meeting, must apply to the Secretary of the Institution for permission. If given, such permission is subject to the Thesis being presented as a Paper in the ordinary way and not being associated with the Diploma Examination.

Thanks of Council.—The Council directs that its thanks be conveyed to the Government Education Departments, the Gas Education Committee, and the Board of Examiners, and to all those who render assistance in connection with the Education Regulations, particularly to the Principals of Technical Colleges and Teachers throughout the country conducting Approved Major and Minor and Gas Fitting Courses, to the Examining Bodies who conduct Ancillary Subject Examinations for External Candidates at home and overseas, to the District Gas Education Committees, and to the City and Guilds of London Institute.

Library Heating by Gas*

While one is unable to lay an egg, he is a poor individual who cannot tell a good one. This piece of sound commonsense is, of course, the product of the facile wit of Mr. *Punch;* with a little facetious digression, Mr. Brian Hill quotes it, in countering an opinion that might exist—viz., the business of the heating system is not that of the librarian, in his excellent contribution on the subject of gas heating to "The Librarian" series of practical manuals.

There is little need for us to dwell upon Mr. Hill's literary ability; it will be recalled that among his successful efforts may be counted "Hide and I'll Find You Out," which was written under the pen-name of Marcus Magill. The story was later the subject of a film. It would also be fatuous to dwell upon his qualifications for the task. An official of the B.C.G.A., Mr. Hill is well informed upon his subject, but he is careful not to allow involved technical descriptions to make the work both difficult for the layman to follow and too long for him to appreciate. The case for gas is presented with a happy balance of theory and practice.

The preface is by the General Editor of the series, each volume dealing with a subject with which the librarian is closely concerned, but which does not come within his professional training. The Author then deals in turn with general considerations, various methods of heating, the advantages of gas, and some gas-fired installations. The book is liberally illustrated, printed in bold type, and indexed.

* "The Librarian" Series of Practical Manuals, IX. Gravesend: Alex. J. Philip. Price 5s.; pp. 62.

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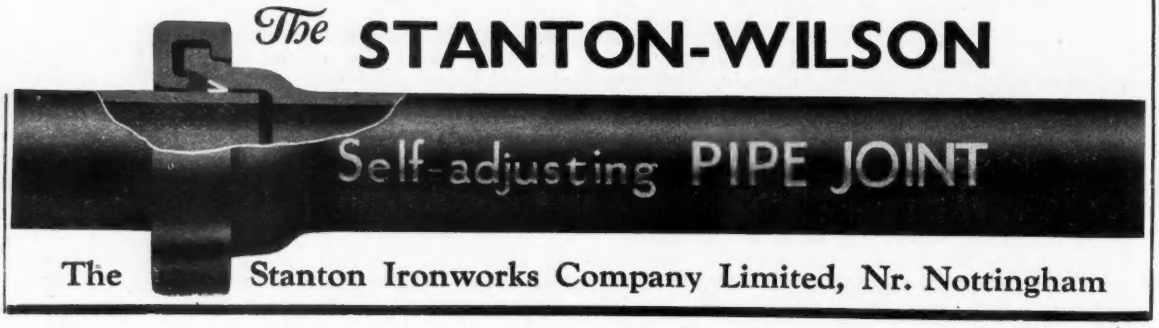
Rigid or Self-adjusting Joints?

Not many of the problems brought into being by the remarkable growth of road transport during the last decade are capable of easy solution.

There is at least one exception, however. For instance, though much has been heard of the danger caused to historic buildings by traffic vibration, the harmful effects of such vibration on water and gas mains are not so apparent. To water and gas engineers responsible, however, for the maintenance of these essential public services, this was a very real problem until a few years ago, for rigidly-jointed mains could not be expected to withstand the severe vibration caused by modern conditions.

Some six years ago the Stanton Company introduced the Stanton-Wilson Self-adjusting pipe-joint to overcome this and similar difficulties. That it has successfully done so is proved by the fact that more than 1,500 miles of Stanton-Wilson mains have now been laid by over 750 public authorities.



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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

Stock Exchange affairs are being influenced again by international problems. As a consequence the revival of interest displayed the previous week came to an end and business fell to a low level, while prices generally, owing to lack of support, were marked down. Just before the close the situation was a little brighter on the prospects of success for the Government's latest non-intervention plans, but this week sees the opening of a new Account which covers the holiday season, so that unless the foreign situation shows a speedy improvement any return to more active conditions appears improbable. One of the very few good features last week was the splendid response to the Blackpool loan—the average allotment being about 1% only—which finally closed at $\frac{5}{8}$ premium. British Funds were fractionally lower, and, with the exception of Transport " C " stock, home rails also finished weaker.

It will be seen in the Stock and Share Lists that gas securities were comparatively well supported and prices continued firm. A feature in the Official List was a sharp rise of 7 points in Cardiff ordinary to 129½, though no business was recorded at about this price, the last transaction noted occurred in February last at 131, so the stock is obviously closely held. Wandsworth 5% preference improved 5 points to 120½, which is doubtless attributable to the powers obtained in the Company's latest Act, which provides, *inter alia*, for the conversion and consolidation of the 5% preference stock with the existing 4% preference stock on the basis of £125 of 4% stock for every £100 of 5% stock. At the Provincial Exchanges the only alteration was a fractional increase in Liverpool ordinary. In the Supplementary List, a big drop of 20½ points occurred in the nominal quotation of Guildford (a subsidiary of Associated Gas and Water Undertakings, Ltd.) consolidated stock to 174½, while both Hampton Court consolidated and Torquay 5% preference dropped 3 points.

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *July* 19.

Prices of tar products in the London market are as follows:
Pitch, 38s. per ton f.o.b.
Creosote, 6d. to 6¼d.
Refined tar, 3¾d.
Pure toluole, 2s. 6d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 8s.; all per gallon naked at makers' works.

Tar Products in the Provinces.

July 19.

The average prices of gas-works products during the week were: Gas-works tar, 23s. 6d. to 28s. 6d. Pitch—East Coast, 36s. to 37s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 36s. to 37s. 6d.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar, crude naphtha, in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 6½d. to 1s. 6¾d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅜d. to 4¼d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 4s. 1½d. to 4s. 3d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal; " B " quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *July* 17.

Market conditions remain unaltered and business is becoming rather quiet with the approach of the holidays.

Crude gas-works tar.—The actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch.—Little new business is being arranged and prices are nominal at about 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar.—Deliveries continue to be taken at a fairly steady rate and makers are maintaining their prices at about 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—There is a steady demand for all grades and supplies are rather difficult to obtain. Business is being put through at the following levels: Specification oil, 5½d. to 5¾d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—While there is a scarcity of new business prices are well maintained as follows: Pale, 97/99%, 4s. 5d. to 4s. 7d. per gallon; dark, 97/99%, 4s. 2d. to 4s. 4d. per gallon; and pale, 99/100%, 4s. 10d. to 5s. 1d. per gallon; all *ex* works in buyers' packages.

Crude naphtha continues to be quoted at 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—There is a steady demand for this material and prices are not less than 1s. 4½d. to 1s. 5½d. per gallon for 90/160 grade, and 11d. to 1s. per gallon for 90/190 heavy naphtha.

Motor benzole.—This remains at about 1s. 4½d. to 1s. 5d. per gallon.

Pyridine.—Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

		s.	d.		s.	d.	
Crude benzole	. . .	0	10	to	0	10½	per gallon at works
Motor "	. . .	1	3¾	"	1	4	" " "
90% "	. . .	1	4½	"	1	5	" " "
Pure "	. . .	1	8⅝	"	1	9	" " "

NEW VERTICAL RETORT PLANTS NOW IN REGULAR SERVICE

This installation, built for the Municipality of Svendborg, Denmark, is an interesting example of the modern Glover-West vertical retort plant designed for the smaller works. It is an eight-retort unit with fuel-gas producers equipped for breeze-burning, waste-heat recovery plant and electric lift. Coaling is by means of an automatic skip-hoist.

400 plants in 24 countries

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

WEST'S GAS IMPROVEMENT CO., LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING ■ **LONDON:** COLUMBIA HOUSE, ALDWYCH, W.C. 2

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

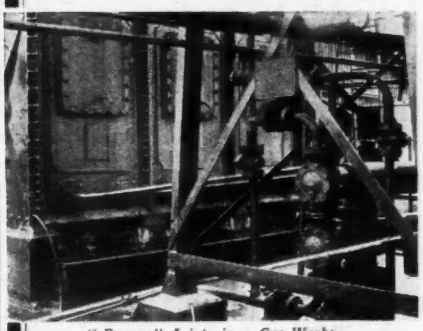
Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 16.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	170—175	...	...
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	...	...
300,000	1	Apl. 5	1/4⅜	1/9⅜	Bombay, Ltd.	25/6—27/6	...	26/3—27/-
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	200
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	161—166	...	163—165
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	101½
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	116—121	...	118
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	155½
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	138—143	...	...
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	130—135	...	134
855,000	,,	Mar. 1	7	8	British Ord.	148—153	...	150
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	140—145	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...	...
120,000	,,	June	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1½—2½	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...	...
150,000	Stk.	June 21	4½	4½	Do. 4½ p.c. Deb. ...	79—84	+1	83½
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	127—132	+7	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅞—1¾	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/—25/-	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	18/—20/-	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	92½
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	74—79	...	76½
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	143—148	...	145½
644,590	,,	,,	5	5	Do. max. div.	109—114	...	...
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c.... ...	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5 p.c. ...	122—127	...	124
176,211	,,	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	July 5	4	7	Gas Consolidation Ord. ...	20/—22/-*	...	...
250,000	1	May 24	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Feb. 1	5½	5½	Gas Light & Coke 4 p.c. Ord.	24/9—25/9a	...	24/10½—25/4½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	82—85	...	83—85
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	100—103	...	101½—102½
2,993,000	,,	July 5	...	3¾	Do 3¾ p.c. Red. Pref.	100—103*	...	102—102½
8,602,497	,,	May 24	3	3	Do. 3 p.c. Con. Deb. ...	80—83	...	80½—82
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	112—112½
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	109—112	...	110—111½
700,000	,,	Mar. 1	25/5§	3¼	Do. 3¼ p.c. Red. Deb....	96—101	...	...
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	120—125	...	...
5,600,000	,,	May 24	8	12	Imperial Continental Cap. ...	148—153	...	150—153
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...	...
285,242	,,	Mar. 1	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	...	...
75,000	,,	May 24	†10	†10	Malta & Mediterranean	150—160	...	...
					Metropolitan (of Melbourne)			
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	98—103	...	102—103
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	98½—99½
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5		Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	96—99*	...	...
675,000	Stk.	May 3	†6	†9	Montevideo, Ltd.	87—92	+1	89½—90
250, 00	,,	Feb. 15	7½	7½	North Middlesex 6 p.c. Con.	160—170	...	...
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	112—117	...	...
300,000	,,	Apl. 19	†9	†7	Oriental, Ltd....	162—167	...	166½—167½
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	160—170	...	...
621,667	,,	Feb. 15	8½	8½	Portsmouth & Gosport Cons.	167—172	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	...
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	112—117	...	...
441,275	1	May 3	1/-	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—23/-	...	21/10½
460,810	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	...	...
133,201	Stk.	Feb. 15	5	8½	Shrewsbury 5 p.c. Ord. ...	140—145	...	...
1,371,752	1	May 3	1/2⅞	1/2⅞	South East'n Gas. Cn.Ld. Ord.	24-/—26/-	...	2 49—25/3
871,636	1	Mar. 1	-/10½	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	21/—21/6
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/6—20/6	...	19/—19/6
450,000	Stk.	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	...
150,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—110	...	108—109½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	132—137	...	131½—134
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...	100
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	...	76½—78
1,000,000	,,	July 5	5	5	Do. 5 p.c. Red. Deb....	106—111*	,,	109—110
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	124¼—125¾
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	97—102	...	...
200,000	,,	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
427,859	1	May 3	9⅜	1/2⅜	S. Western Gas & Water Ord.	19/—21/-	...	...
160,523	1	Apl. 19	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
750,541	,,	Feb. 1	5	5½	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	...
350,000	,,	Feb. 15	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
94,000	,,	June 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	97½
1,076,490	,,	Feb. 15	6½	6½	Tottenham and District Ord.	137—142	...	140—142
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref....	123—128	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
750,000	1	Apl. 5	4	6	U. Kingdom Gas Cor. Ord.	20/6—22/6	...	21 3
936,338	1	May 3	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	20,9—21/3
740,933	1	June 7	4½	4½	Do. 4½ p.c.2nd Non-Cum.Pf	17/—19/-	...	17/9—18/3
700,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	97¼—97¾
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	150—155	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	143—148	...	145
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	118—123	+3	119
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	97—100	...	...
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	...	116½—117½
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	123—128	...	...
200,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

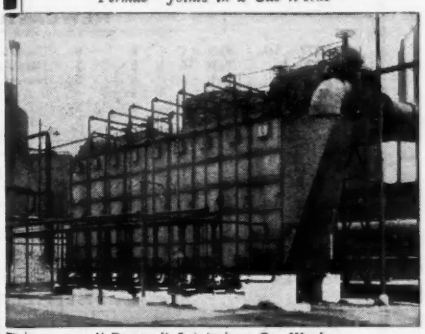
Stock and Share List continued overleaf.

There's only one Permac!

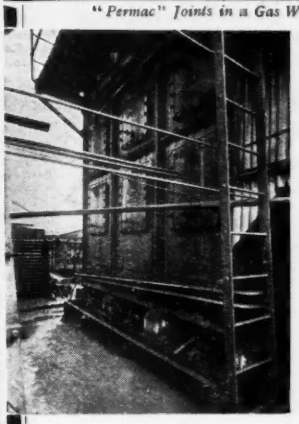
METAL-TO-METAL JOINTING MATERIAL.



"Permac" Joints in a Gas Works



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Be sure you get it!

"Permac" *makes leak-proof joints which last till you want to break them down.* For over 25 years it has been holding up difficult joints in important Gas Works and on Coke Oven Plant all over the country. Here are a few photographs. Beware of cheap imitations.

Sole manufacturers:

THOMAS & BISHOP LTD.
37, Tabernacle St.
LONDON, E.C. 2

Telephone: Clerkenwell 3351 (2 lines)

STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. July 16.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 1	5	6	Bath Cons.	121—123	...	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	116—117	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	103—108	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.	89—94	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	126—128	+½	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Cn. & New	124—126	...	...
2,061,315	,,	Feb. 1	5	5⅝	Newcastle & Gateshead Con.	25/3—25 9*a*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	100—101	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	91—92	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	155—165	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	June 21	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	144—146	...	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.	100—103*	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-*b*	25/-*b*	Ascot Ord.	102—107	...	...
128,182	,,	July 5	5	5	Do. 5 p.c. Pref.	108—113	...	109
474,410	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
500,000	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	20/6—20/7½
500,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	97¼—97¾
31,035	1	...	...	...	Associated Utilities 4 p.c. Pref.	17/—19/-	...	17/9
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	161—162
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	195—205	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	137—142	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max. ...	40—45	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.	120—125	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	172—177	−20½	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	115
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	160—165	−3	161—164
73,620	,,	Mar. 15	8½	8½	Luton Cons. 'A'	166—171	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	207—212	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
25,570	,,	Feb. 15	5½	5½	Rugby 5½ p.c. Pref.	125—130	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...	...
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117	...	...
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	140—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	−3	110—112
130,000	,,	Feb. 15	5	5	Wakefield Ord.	126—131	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	June 21	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c Cons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...

a The quotation is per £1 of Stock. *b* Assual for Quarter. * Ex div.

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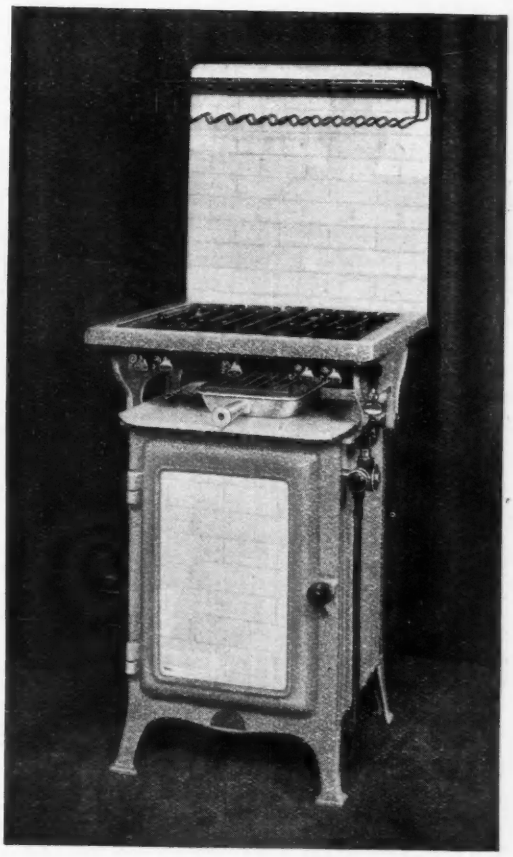

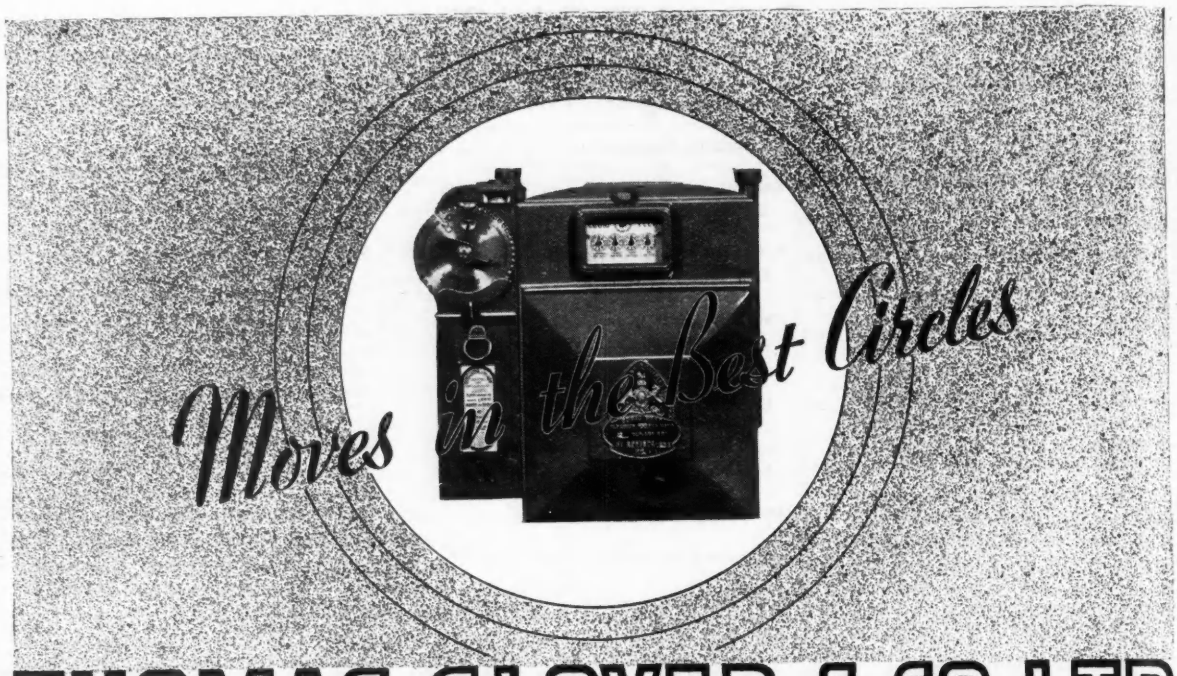

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